THE LIFE

TRAVELS AND BOOKS

OF

ALEXANDER VON HUMBOLDT.

WITH AN INTRODUCTION

BY BAYARD TAYLOR.

Stoddard, R. H.

"I am become a name;
For always roaming with a hungry heart
Much have I seen and known; cities of men
And manners, climates, councils, governments,
Myself not least, but honored of them all."

TENNYSON.

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PREFACE.

There are several biographies of Humboldt, French, German, and English, but none of any importance, except Professor Klencke's. Klencke had an excellent opportunity to make a good book, for much of his material was obtained from Humboldt himself, but he failed to do so. He seemed to have no idea of writing, beyond its being a means of conveying facts. *His facts are reliable, but bunglingly arranged, without order or method. He says the same thing over and over again, and entirely lacks the chief requisite of a biographer—the art of making his subject attractive. Still, he is reliable, and the author has made considerable use of his work, especially in Book I.*

The first five chapters of Book II. are taken from Humboldt's "Voyage aux Régions Equinoxiales." *As these chapters cover an important epoch in Humboldt's life, it was thought advisable to let him tell his own story, and this has accordingly been done, wherever it was practicable, the relation being changed from the first person to the third—from autobiography to narrative. Of course only the*

substance *of the* "Voyage" *is given, for the work extends to three octavo volumes, of four or five hundred pages each. It would have been easy to have rewritten this matter, but the author could not see the advantage of so doing: his book would have gained something in originality, but it would have lost much more in interest. No writer of travels, ancient or modern, can compare with Humboldt in descriptive power, especially in the* "Voyage," *where his words are pictures. These pictures have been faithfully transferred to the chapters mentioned, and are commended to the reader's attention.*

The chapters on Colombia and Peru, and Mexico, are made up from the "Vues des Cordillères," *the* "Ansichten der Natur," *and the* "Essai politique sur le Royaume de Nouvelle Espagne." *They are not so complete as the author could have wished, but that is rather Humboldt's fault than his own, for the* "Voyage" *which would have furnished material for them, had it ever been completed, ends abruptly at Carthagena. Beyond that point the narrative of the journey ceases. Gleams of it occur, however, in Humboldt's other works, chiefly in those just mentioned, and it is by these that his progress has been traced until his return to Europe. If this portion of the Biography lacks the picturesque and adventurous element of the chapters that precede it, it has at least the merit of variety, and of being the fullest account of the last two or three years of Humboldt's eventful journey in the New World. The works specified above having been translated into English, the translations have been generally used,*

not because the author preferred them to their originals, but because he doubted his ability to better them. It is one thing to find fault with a translator for his shortcomings, but quite another thing to avoid them in one's own translation. The translators to whom the author of this Biography is indebted are: Thomasina Ross, for the "Voyage;" *Mrs. Sabine for the* "Ansichten der Natur;" *Helen Maria Williams, for the* "Vues des Cordillères;" *and John Black for the* "Essai politique." *The last two works are out of print, though copies are occasionally to be found at the old book stalls; the* "Ansichten der Natur," *and the* "Voyage," *or as it is christened in the translation, the* "Personal Narrative," *are in print, though scarcely within the reach of the general reader, never having been reprinted in this country. The English edition of the* "Personal Narrative" *costs three times as much as the present volume.*

The chapter on Central Asia, in Book III., which is the substance of Rose's "Reise nach dem Ural," *is rewritten and enlarged from Mr. Taylor's* "Cyclopædia of Modern Travel." *These, as far as the author remembers, are the principal sources to which he is indebted. He should mention, perhaps, the various French and English Encyclopædias from which he has filled up his sketches of some of Humboldt's contemporaries, but Encyclopædias have no authors, as everybody knows; besides, they are made for the very purpose to which he has put them. The same may be said of the journals of the day.*

The reader now understands the extent of the author's

obligations in this Biography. Of the Biography itself it does not become the author to speak, further than to say that he has taken great pains to make it accurate. If it shall be considered as readable as it is accurate, he will have accomplished his purpose, which was to write a popular life of Humboldt.

INTRODUCTION.

A Biography of Alexander Von Humboldt, which shall contain a full and conscientious account of his life and labors, written in a style sufficiently clear and untechnical to meet the popular tastes, has long been a necessity in our literature. Those biographies which are already in existence do not possess this character: they are rather chronicles of his achievements in the various departments of natural science, than stories of a life almost unexampled for its wealth of experience, its labors, and successes. The "Lives of the Brothers Humboldt," by Klencke, which has been translated into English, is very fragmentary in this respect; it passes over unnoticed, many episodes in the life of Alexander Von Humboldt, which are of great interest to the general reader. In fact, it has only been in the closing years of his life, that the excellences of his character, *as a man*, apart from his distinction as a *savant*, have received full and general acknowledgment.

No task could have been pleasanter to me than that of attempting to bring home to the familiar acquaintance of

the great reading public of the United States, the history of the great man, with whose friendship I was honored; and, as the literary labors I had already on hand prevented me from undertaking such a work, it is all the more gratifying to me to know that it has been faithfully and conscientiously done by one every way capable of the performance. Having examined the biography which follows, I can testify to its exactness and completeness, and therefore—though the subject of the book is its own sufficient recommendation—cordially accede to the request of the author, that I should add a few words of introduction, embodying my own impressions of Humboldt's character.

When I first saw him, he was in his eighty-eighth year, but, except in the bowed head and slow step, showed scarcely any signs of bodily decay. A portrait, painted nearly forty years before, at which time his hair was already gray, showed that time had occasioned but little change in his appearance, while its only effect upon his mind was, perhaps, a lack of that power of concentration which enabled him to master so many various departments of natural science. He was still every inch a king, with no faculty appreciably dulled, no sympathy blunted, no hope for the increase of human knowledge or generous aspiration for the good of his kind less earnest than in his prime of life. A year later, I found him broken, indeed, in bodily health, yet still capable of sixteen hours of continuous mental labor, and his last letter to me, written but a short time before his death, betrayed no sign of failing faculties, though the hand which traced it was evidently weak and trembling.

In the castle at Tegel, where he was born, and in the park of which he now sleeps beside his brother, hangs a portrait of him, painted at the age of thirty-five. He is there represented as man of rather less than the medium stature, but firmly and symmetrically built, with a full, keen, ardent face, firm lips, clear blue eyes, and thick locks of chestnut hair, clustering about his square, massive brow. He wears a green coat, knee-breeches, and a heavy cloak lined with red. He is represented as leaning against a rock on a slope of the Andes, the snowy dome of Chimborazo filling up the background of the picture. In comparing this picture with his living presence, I found that the shoulders had stooped, leaving the head bent forward, as if weighed down by the burden of its universal knowledge; the hair had grown snow-white, and somewhat thinner; the mouth had lost its clear, sharp outline, and the eager, energetic expression of the face was gone: but the blue eyes were as serene and youthful as ever, and the skin as fair, smooth, and ruddy, almost, as that of a young man.

The first impression produced by Humboldt's face was that of its thorough humanity. The blood which fed his restless brain never weakened the pulsations of his human heart. Beneath that devotion to science which he illustrated by the labours of seventy-five years, burned steadily and unwaveringly the flame of sympathy for his kind. Probably no man who ever lived has given aid and encouragement to so great a number of aspiring and deserving men. I know instances of persons in humble life having sought

his assistance for themselves or their friends, and in no case was it refused. The applicants returned from the interview cheered, inspired, and full of affectionate veneration for the man who, in the midst of his immense labours, could yet give an hour to themselves and their plans. No rational appeal to him was ever slighted, and the vast influence which he possessed, in his later years, was always exerted in the behalf of science, and her earnest votaries.

Jealousy of his fellow-labourers formed no part of his nature. His enthusiasm was too pure and ardent to be alloyed by any personal consideration. Not his own fame —not his supremacy as an observer or a theorizer—but the advancement of human knowledge, the discovery of grand general laws—the footsteps of God in the Creation—was his aim and his ambition. What he has done is not to be measured by his own individual achievements: the generous impulse which he has given to others cannot be estimated. The vast results which have followed scientific research, since the commencement of this century, were initiated by his example; he pointed out to others the tracks which he could not himself follow, and, even when acknowledged as a leader, never hesitated to labor with the humblest. In this respect, his character presents an almost ideal excellence.

The lesson of Humboldt's life is not without its special significance at the present day, when the thirst for wealth, and place, and power, seems hotter and fiercer than ever. With the advantages of his birth and inherited position, many paths of advancement were open to him, but he disdained them all, sacrificing everything to his love of know-

ledge, until finally, in his old age, honors such as no statesman ever won, were laid as voluntary offerings at his feet. The indifference which he regarded them showed how little such rewards had entered into his plan of life. Yet, though the acknowledged equal of kings, he was never seduced by the splendors of courts to forget his character as a man, whose sympathies were with the people rather than their rulers. So well were his political predilections understood among the monarchs who called him friend, that at the Congress of Verona, of which he was a member, when he proposed some temporary measure which had an arbitrary character, the Emperor Alexander I. of Russia, turning to him, said in a tone of mock reproach: "And is it you, arch-republican as you are, who propose this despotic measure?" This incident was related to me by Humboldt himself, during my last interview with him. One can therefore understand the depth of that esteem felt for him by the present demented king of Prussia, when the latter introduced Humboldt to the Emperor Franz Joseph of Austria, at Prague, some four or five years ago. His jesuitical majesty asked: "Who is the Baron Von Humboldt, that you present him to me with so much *empressement?* I have never heard of him!" "Not heard of him!" exclaimed the king, in honest amazement; "why he is the greatest man since the Deluge!"

Humboldt's large fortune was wholly expended in the prosecution of his travels and the publication of his works, and during the later years of his life, he was entirely dependent on his diplomatic pension, and the copyright of his

"Kosmos." To my friend Heine, the artist, he sent his own copy (the original edition) of his "*Vues des Cordillères*," containing some of his marginal notes. On learning that the same gentleman had been obliged to go to America through his connexion with the events of 1848, he prevailed upon the king of Prussia to grant him the Order of the Red Eagle—through which recognition the official ban was removed. This is but one instance of the many acts of kindness on his part, with which I have become acquainted.

His mind was so admirably balanced—his development was so various, and yet so complete in every department of science, that his true greatness is not so apparent as in the case of those who have risen to eminence by devoting themselves to some special study. Perfect symmetry never produces the effect of vastness. It is only by studying the details that we comprehend the character of the whole. Humboldt, however, may be termed the father of Physical Geography, and the suggester, if not the discoverer, of that system of the distribution of plants and animals which opens to our view another field of that Divine Order, manifested in the visible world. He strove to grasp those secrets, which, perhaps, no single mind will ever be able to comprehend—the aggregate of the laws which underlie the mysteries of Creation, Growth, and Decay; and though he fell short of the sublime aim, he was at least able to say, like Kepler, when he discovered the mathematical harmonies of the solar system; "Oh, Almighty God, I think Thy thoughts after Thee!"

The record of such a life, even in its external aspects, is pregnant with suggestions. It is a magnificent illustration of true success. A combination of the purest and noblest human character with splendid qualities of the mind is unfortunately rare. Without the former, Humboldt might have achieved the same success in his own personal labors, but he could not have given the same impetus to scientific research in all parts of the world. The satisfaction we feel in contemplating his life arises from its completeness. In him the heart was the focus of warmth, whence radiated the light of his intellect.

The Portrait which accompanies this volume, is copied from a photograph which I obtained from Berlin, and which is a perfect representation of Humboldt, in his eighty-sixth year.

BAYARD TAYLOR.

NEW YORK, *August*, 1859.

BIBLIOGRAPHY.

Ueber die Basalte am Rhein nebst Untersuchungen über Syenit una Basanit der Alten. Berlin, 1790

Flora Fribergensis, prodromus. 4to. Berlin, 1793

Specimen Floræ subterraneæ Fribergensis et aphorismi ex physiologia chimica plantarum. 4to. Berlin, 1793

Versuche über die gereizten Muskel- und Nervenfasern nebst Vermuthungen über den Chemischen Process des Lebens in der Thier- und Pflanzenwelt. 2 vols., 8vo. Posen, 1797

Versuche über die Chemische Zerlegung des Luft-Kreises und über einige andere Gegenstände der Naturlehre. Plates, 8vo. Brunswick, 1799

Ideen einer Physiognomonik der Gewaeschse. 4to. Tubingen, 1806

Versuche über die Electrischen Fische. 12mo. Erfurt, 1806

Physique générale et Géologie. 4to. Paris, 1807

Essai sur la Géographie des Plantes accompagné d'un Tableau physique des Régions équinoxiales, fondé des mesures executées depuis le sixième degré de latitude boréale jusqu'au dixième degré de latitude australe, par Humboldt et Bonpland. 4to. Paris, 1807

Ansichten der Natur. 2 vols., 12mo. Stutgard & Tubingen, 1808

Melastomatologia, sive descriptio Melastomati et generum affinium. Plates, Fol. Cassel & Paris, 1808

Conspectus longitudinum et latitudinum geographicarum per decursum annorum 1799 *ad* 1804, *astronomia observatarum.* Plates, Fol. Cassel, 1808

Plantes Equinoxiales recueillies au Mexique, dans l'Ile de Cuba, dans les Provinces de Caraccas, de Cumana et de Barcelone, aux Andes de la Nouvelle Granade, de Quito, et de Perou, et sur les Bords du Rio Negro, de l'Orénoque, et de la Rivière des Amazones, par Humboldt et Bonpland. 2 vols., Fol. Paris, 1808–1809

Vues des Cordillères, ou Monumens des Peuples indigènes de l'Amerique. Plates, Fol. and 8vo. Paris, 1810

Recueil d'Observations astronomiques, d'Opérations trigonométriques, et de Mesures barométriques. Redigées et calculées d'après les Tables les plus exactes par J. Oltmans. 2 vols., 4to. Paris, 1810

Ideen zu einer Geographie der Pflanzen. 4to. Vienna, 1811

Essai politique sur le Royaume de la Nouvelle Espagne, avec un Atlas physique et géographique, fondé sur les Observations astronomiques, des Mesures trigonométriques et des Nivellemens barométriques. Atlas Fol., Texte 2 vols., 4to. Paris, 1811

Recueil d'Observations de Zoologie et d'Anatomie comparée, faits dans l'Ocean Atlantique, dans l'Intérieur du Nouveau Continent et dans la Mer du Sud. Par Humboldt et Bonpland. 2 vols., 4to. Paris, 1811–1833

Voyage aux Régions équinoxiales du Nouveau Continent, fait en 1799, 1800, 1801, 1802, 1803, *et* 1804. *Par A. de Humboldt et A. Bonpland. Redigé par A. de Humboldt. Avec deux Atlas, qui renferment l'un les Vues des Cordillères et les Monumens des Peuples indigènes de l'Amerique, et l'autre des Cartes géographiques et physiques.* 3 vols., 4to. Paris, 1814–1825

Nova Genera et Species Plantarum in Peregrinatione Orbis Novi collegerunt, descripserunt, partim adumbraverunt A. Bonpland et A. de Humboldt. In ordinem digessit C. S. Kunth. 7 vols., Fol. Paris, 1815–1825

Monographie des Melastomacées comprenant toutes les Plantes de cet ordre recueillies jusqu'à ce jour et notamment au Mexique, dans l'Ile de Cuba, &c., mise en ordre par A. Bonpland. Fol. Paris, 1816

De Naturali familia graminum. Fol. Paris, 1817

Des Lignes isothermes et de la distribution de la chaleur sur le globe. 8vo. Paris, 1817

De Distributione geographica Plantarum secundum Cœli Temperiem et Altitudinem Montium. Prolegomena. 12mo. Paris, 1817

Memoire sur la fixation des limites des Guyanes Française et Portuguaise. 4to. Paris, 1818

Mimoses et autres Plantes legumineuses du Nouveau Continent, décrites et publiées par C. S. Kunth, avec Figures coloriées. 2 vols., Fol. Paris, 1819

Synopsis Plantarum quas in itinere ad plagam æquiam Orbis Novi Collegerunt Humboldt et Bonpland. 4 vols., Fol. 1822–1826

Essai géographique sur le Gisement des Rochers dans les deux hemispheres. 8vo. Paris & Strasburg, 1823

Ueber den Bau und die Wirksamkeit der Vulkane. 8vo. Heidelberg, 1824

Evaluation numérique de la population du Nouveau Continent, considérée sous le rapport de la difference des cultes, des races, et des idiomes. 8vo. Paris, 1825

Essai politique sur l'Ile de Cuba, avec une Carte et un Supplément qui renferme des Considérations sur la Population, la Richesse territoriale et le Commerce de l'Archipel des Antilles et de Colombia. 2 vols., 8vo. Paris, 1826

Von der in Verschiedenen Theilen der Heissen Zone am Spiegel des Meeres Stattfindenden Temperatur. 8vo. Leipzig, 1826

Ueber die Hauptursachen der Temperatur-Verschiedenheit auf dem Erdköper. 4to. Berlin, 1827

Observations sur quelques phénomènes peu connus, qu'offre le goître sous les tropiques, dans les plaines, et les plateaux des Andes. Paris, 1828

Révision des Graminées, publiées dans les Nova Genera et Species Plantarum de Humboldt et Bonpland, précédée d'un travail général sur la famille des Graminées, par C. S. Kunth. Ouvrage accompagné de cent Planches coloriées. Fol. Paris, 1829

Ueber die bei verschiedenen Völkern üblichen Systeme von Zahlzeichen und über Ursprung des Stellenwerthes in den Indischen Zahlen. 4to. Berlin, 1829

Fragmens de Géologie et de Climatologie Asiatique. 2 vols., 8vo. Paris, 1831

Astronomische und hypsometrische Grundlagen der Erdbeschreibung. 8vo. Stutgard & Tubingen, 1831

Tableau statistique de l'Ile de Cuba pour les années 1825 *à* 1829. 8vo. Paris, 1831

Examen critique de l'histoire de la Géographie du Nouveau Continent, et des Progrès de l'Astronomie nautique au XVe et XVIe siècles. 5 vols., 8vo. Paris, 1836–1839

Petrifications recueillies en Amerique décrites par Leopold de Buch. Plates, Fol. Berlin, 1839

Asie Centrale, Recherches sur les Chaînes de Montagnes et la Climatologie comparée. 3 vols., 8vo. Paris, 1843

Kosmos, Entwurf einer Physischen Weltbeschreibung. 5 vols., 8vo. Stutgard & Berlin, 1845–1858

Kleinere Schriften, erster Band; Geognostische und Physikalische Erinnerungen mit einem Atlas enhaltend Umrisse von Vulkanen aus den Cordilleren von Quito und Mexico. 8vo. Stutgard & Tübinger., 1853

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CHAPTER I.

CHILDHOOD AND YOUTH.

THREE leagues from the good city of Berlin, near an arm of the Havel, called Tegel, stands, or stood ninety years ago, the old castle of Tegel. Behind it lay a grove of dark pines which separated it from the capital; on the southern shore of the lake were the town and fortress of Spandau, and to the north-west grassy and wooded declivities, studded with promenades and gardens. Doubtless this castle, gray and antiquated, had a stirring history of its own in the days of old, but of this Tradition is silent. All that we know is, that shortly before the opening of this life-history, it was the residence of a Prussian commissioner of woods and forests, who had greatly beautified it by the laying out of nurseries and plantations. This commissioner, whose name was Von Burgsdorf, was succeeded in 1768, or thereabouts, by Major Alexander George Von Humboldt.

Major Von Humboldt was born in 1720. His father, Hans Paul Von Humboldt, served as a captain in the army of Frederick William the First; his mother was the daughter of the Prussian major and general adjutant, Von Schweder; it was natural therefore that he should follow the profession of arms. He served for a long

time in a dragoon regiment, and was then made major, and finally adjutant to Duke Frederic of Brunswick, who often sent him on embassies to Frederic the Great. This was in the famous seven years' war. When the war was over, in 1765, the great Frederic made him one of his chamberlains; he was also attendant chamberlain on Elizabeth, the newly-married princess of Prussia. His official duties compelled him to reside in Potsdam, where he probably met the lady who became his wife. A descendant of the family of Colomb, which emigrated from Burgundy, where it was celebrated for its glass works, she was the widow of a Baron Von Holwede Major Von Humboldt persuaded her to change her weeds for the orange wreath, so they married and settled in Potsdam. Their first child, William, was born there on the 22d of June, 1767. They lived in Potsdam but a short time, two or three years at most, for the marriage of the princess being at length dissolved, she had no further need of an attendant chamberlain, consequently Major Von Humboldt was at liberty to change his residence, if so inclined. He exchanged Potsdam for Berlin, and lived partly there, and partly in his castle at Tegel. How he became possessed of the castle is not stated. It was originally a hunting seat of the great Elector, and a hunting establishment was kept up there under Frederic the Great. The Major's second son, Frederic Henry Alexander, was born at Berlin on the 14th of September, 1769. It was principally at Tegel, however, that his childhood passed.

Of the first years of his life nothing remarkable has been related. There is a sameness in the lives of children, no matter what their rank or talents. If they

happen to become famous in after years, admiring and credulous biographers tell wonderful stories about them, but for the most part these stories are myths. The infancy of the great, we think, should be surrounded with marvellous influences. It will never do for us to make them common mortals like ourselves. So if we fail to discover any traits of early divinity we must boldly invent them. Should the cheat be discovered the world will forgive it, for the sake of the pleasure it has given them.

That the childhood of Alexander, however, was an exceedingly happy one, cannot be doubted, for if ever Nature was kindly disposed towards any of her children, it was towards him. He was born of wealthy and noble parents, who mingled, by virtue of their rank and worth, with the most illustrious of the land. His home, the old castle of Tegel, situated in a pleasant country, was surrounded by charming and varied landscapes. His earliest glimpse of Nature was beautiful enough to make him desire to see the rest of the book: it was a fair page that opened before his childish eyes. And here, if the reader is imaginative, he can employ himself in filling up the outlines of the first five or six years of Alexander's life. He may picture him in the chambers of the old castle, climbing up his father's knee, and wondering, as he runs his fingers through his gray hair, what the wrinkles on his forehead mean; or tugging at the gown of his mother to make her answer some unanswerable question; or, likelier still, scrambling on the floor with his brother William, and a heap of toys. Some day when playing alone, he sees the bookcase in the corner, and remembering, as in a dream, the pic-

tures with which the nurse pacified him when he was sick, he goes to it, and opening the door softly, lights by a sort of impish instinct, on the costliest volume on the shelves. It is some famous work on natural history, a ponderous quarto filled with coloured prints of strange plants and animals, and still stranger men. He pores over them with great eyes. Fearing at last that he is in mischief, for she has heard nothing of him for a long time, his mother steals into the room, and finds him fast asleep, with the book in his lap. As he grows older he takes himself out of doors on all possible occasions. Now he is in the garden, plucking and studying flowers and grasses; now in the pine grove filling his pockets with last year's cones and needles, and now by the edge of the lake, skimming pebbles over its surface, or watching its fleet of mirrored clouds.

In such wise, says Fancy, who is sometimes truer than Fact, lived the boy Alexander, until 1775, when his education commenced. The science of education, a science which is still in its infancy, the opinion of its professors to the contrary notwithstanding, was at that time agitating the European world. The new method of Rousseau, which aimed at the physical as well as the mental development of its pupils, and which considered the study of natural science full as important as that of metaphysics, and the classics, had made many adherents in Germany, and among others Joachim Heinrich Campe. Born in 1746, Campe studied theology at Helmstadt and at Halle, and was appointed, in 1773, chaplain to the Prince of Prussia's regiment in Potsdam. He fulfilled for two years the duties of his sacred calling in that doubtful sphere of action, and feeling himself much more

fitted to teach children than men, and those men soldiers, he was transplanted by Major Von Humboldt to teach his sons, at the old castle of Tegel. A ripe and varied scholar even then, he enjoyed in after life the reputation of being, next to Klopstock, the greatest philologist and critic of German style. He is the author of a German dictionary, and other works calculated to improve the language. But the books by which he is best known are those of travel and adventure. The chiefest of these are his "Discovery of America," and "Robinson Crusoe."

Looking back from the vantage ground of Time, and bearing in mind what Alexander Von Humboldt has done, what might have seemed a trivial thing then, a mere lucky chance, now seems the special ordering of Nature. He was fitted, we have since learned, to perform a great work for her; but before he could perform that work it was necessary that she should reveal it to him. If the child is to become the father of the man, the man must somehow be brought before the mental eye of the child. His infancy must be nurtured by noble books, and wise teachers, or

"By solemn vision, and bright silver dream."

What better teacher could the boy have had, considering the work he was to do, than one who translated that marvellous fiction of the homely old truth-teller, De Foe, —the fresh, unfading, world-renowned Robinson Crusoe? It was the book of all others to fire his youthful imagination with the desire of travel, and to fill his mind with the unconquerable spirit of adventure. It was a happy day when Joachim Heinrich Campe, philologist, critic,

translator, and finally bookseller, became the tutor of Humboldt.

He remained in the family a year, teaching the eldest boy the languages, and the youngest, who was then in his seventh year, whatever he was pleased to learn. Alexander was not so robust as his brother, for his health was considered delicate for many years, nor was he regarded as his equal in mental endowments.

Their next tutor was a young man of twenty, poor in this world's goods, but rich in what the proverb declares to be better than houses and lands—Learning. His name was Christian Kunth. He is said to have possessed an extraordinary knowledge of German, Latin, and French literature, and to have been deeply read in philosophy and history. He taught William the languages, and Alexander the natural sciences. One studied Man in classic antiquity and art, the other the World in its manifold forms and appearances. It seems strange, not to say impossible, for children of eight and ten to pursue such profound studies, but we must remember that these were not common children.

Nor was their teacher Kunth a common man. Had he been he would have stopped here. But having sense as well as learning, he took care of their bodies as well as their minds. Instead of merely cramming them with books until they became unwholesome monstrosities, mental *patés de foie gras*, he gave their thoughts and limbs free play, in the wind, and dew, and sunshine. They had holidays whenever they needed them; long walks with Kunth in the woods and fields; sails on the blue bosom of the Tegel lake; excursions to the fortress of Spandau, and now and then a flying visit to Berlin.

Or they threw aside their books, and ran off by themselves, like the children they were, and romped and played to their hearts' content. This kept the roses of health in their cheeks (Alexander's as yet were delicate buds), and enabled them to

> "bear their weight
> Of learning lightly, like a flower."

But for this it might have been a nightshade of deadly power. Besides, their life was diversified by the coming and going of visitors: for their father was hospitable, and the castle was always open to his friends. Retiring from the world with honor, the world sought him, in the shape of its princes, statesmen, and scholars, to say nothing of generals, colonels, and the like, his old companions in arms. Among other celebrities who enjoyed the hospitalities of Tegel was Goethe, who accompanying Duke Karl August to Berlin in May 1778, to see a grand review, strolled over Schonhausen one morning and dined at the castle, with the Major and his family. Little did the man of thirty know that he saw in the boy of nine, one who was destined to accomplish as much in Science, as he himself in Literature. But the time came when he knew him, and admired him, none more warmly.

Among the most frequent of the visitors at the castle was Dr. Ernst Ludwig Heim, of Spandau, who, having attended the now officially-defunct head-ranger, Von Burgsdorf, continued his visits, medical and friendly, to his successor, Major Von Humboldt. And the major stood in need of his services, for his health, which had

been broken for some time, now began to fail rapidly. Day after day Dr. Heim might have been seen on horseback, with his saddle-bags full of medicine, rounding the stretch of land between Spandau and Tegel. But he could do little for the shattered constitution and the sixty years of his patient. He died in January 1779, and was buried at Tegel.

After the major's death Dr. Heim continued to come as usual, not now bringing medicine, let us hope, but with a book under his arm for Kunth, or possibly for William and Alexander. Or perhaps it was a rare flower from his conservatory. For as long ago as the days of Von Burgsdorf he was noted for his knowledge of foreign trees and plants, and he helped the head ranger to lay out the nurseries and plantations, which the Humboldts were now enjoying. He would drop in near their dinner hour, and being pressed would remain to dinner, and often for hours after, instructing the boys in botany, and explaining to them the twenty-four classes of the system of Linnæus. They could now know the names, classes, and characteristics of the flowers, which they had before admired ignorantly. William was considered the cleverest, because he could easily comprehend the doctor's lessons, and retain the botanical names: Alexander was not, or did not seem, so apt. The brothers went with the doctor in his excursions about the neighbourhood, and in May 1783, were present with him in Spandau, where they saw Frederick the Great reviewing his grenadiers—one of his annual amusements.

But grand reviews, country excursions, after-dinner chats on botany, and the cosy comforts of home, must

soon come to an end. For though the widowed mother lives only in her children, she knows that they must one day be men, and go out into the world. So the best thing they can do is to go to Berlin, and pursue their studies, and enlarge their experiences. To Berlin they go.

They are instructed in Greek and the modern languages, William having great philological talent, while Alexander, whose love of the natural sciences grows with his growth, continues the study of botany under the celebrated botanist Wildenow. Kunth, who accompanies them, engages Engel, Klein, Dohn, and others to give them complete courses of lectures on philosophy, law and political economy. Nor do they neglect the literature of their own land and time. They read Goethe and Schiller together. William prefers "Werter," and "Don Carlos," and their art-writings; Alexander, while he admires these, prefers Goethe's more abstruse researches in natural history. So passes the time, now in the bustle of the capital, and now in the quiet of the old castle at home. Dear old Tegel! it is doubly dear to them now. For there their mother lives, and there lies their dead father's dust.

In 1786 they commenced their academical life in the University of Frankfort on the Oder, where they remained nearly two years, William devoting himself to the study of law, and Alexander to political economy. In 1788 they removed to the University of Gottingen.

The name of this University will remind the reader of English comic poetry, of Canning's famous song in the burlesque drama, "The Rovers."

"Whene'er with haggard eyes I view
This dungeon that I'm rotting in,
I think of those companions true,
Who studied with me at the U-
-niversity of Gottingen,
-niversity of Gottingen."

The stanzas are quizzical enough, but the University itself was a staid, grave place, full of earnest students, and learned professors. Among the latter we may mention three who were celebrated in their different branches of literature and science, and who helped to mould the minds of William and Alexander. These were Blumenbach, Heyne, and Eichhorn. Eichhorn, the professor of Arabic, was a profound scholar, especially in biblical literature, of which he may be considered the historian. He filled the chair of Theology. In the chair of Archæology sat Christian Gottlob Heyne, a venerable man of sixty, who had risen from the lowest circumstances by the force of his will, and his talents. His *specialité* was classic bibliography. He edited Homer, Pindar, Diodorus Siculus, Epictetus, Virgil, Tibullus, and other Greek and Roman authors, great and small, enriching their text with learned commentaries. When the Humboldts became his scholars he was busy making out a catalogue of the immense library of the University.

Last was Johann Frederic Blumenbach, professor of physiology and comparative anatomy. Passionately attached to science all his life, which by the way was nearly as long as that of his famous pupil, Humboldt, his love of anatomy commenced at the early age of ten, from accidentally seeing a skeleton in the house of one of his father's friends, a physician of course. He soon had a

collection of bones and skulls of his own, and taking tc medicine in Jena, obtained his degree in Gottingen in 1775. The next year he was appointed conservator of the noble Museum of Natural History in the University, which he enriched by numerous collections of great value. He preceded Cuvier in many of his discoveries, instituting, shortly before the Humboldts entered his classes, the method of comparing different varieties of human skeletons, and skeletons of animals. To the care of these famous professors William and Alexander were committed by their old tutor and friend, Kunth, and they remained under their teachings for two years. Strongly attracted by Eichhorn and Heyne, William pursued his favorite studies, philology and art, while Alexander speculated on "the ground plan of man" in the lecture room of Blumenbach.

But the person who exercised the most influence over him while at Gottingen, was the son-in-law of his teacher, Heyne—George Forster. Nor is this at all strange, for the experience of every day shows us that the influence of man over man outweighs that of books a thousand fold. There are times, indeed, when even a bad man is more potent than many good books. Blumenbach, Heyne, Eichhorn, and the rest, excellent and indispensable as they were, were books, so to speak, dead books to the realistic Alexander, while Forster was a man, a live man. He had seen what they had only dreamed of. The feats of Alexander's mythical friend, Crusoe, were outdone by Forster. Not that Forster had ever been shipwrecked on a solitary island; but he had done better—he had put a girdle round the earth. Some sixteen years before, when a boy of eighteen, he had

accompanied Captain Cook as a naturalist in that great navigator's second voyage round the world. Afterwards professor of natural history in Hesse Cassell, and at Wilna, he was now spending the summer with his wife at the house of his father-in-law, Heyne. He had written several works on natural history, geography, philosophy, and politics, besides a history of his voyage round the world. Writing of Forster in 1844, more than fifty years after his death, Humboldt paid the following tribute to his memory:

"Through him began a new era of scientific voyages, the aim of which was to arrive at a knowledge of the comparative history and geography of different countries. Gifted with delicate esthetic feelings, and retaining a vivid impression of the pictures with which Tahiti and the other then happy islands of the Pacific had filled his imagination, as in recent times that of Charles Darwin, George Forster was the first to depict in pleasing colors the changing stages of vegetation, the relations of climate and of articles of food in their influence on the civilization of mankind, according to differences of original descent and habitation. All that can give truth, individuality, and distinctiveness to the delineation of exotic nature is united in his works. We trace, not only in his admirable description of Cook's second voyage of discovery, but still more in his smaller writings, the germ of that richer fruit which has since matured."

Such was George Forster, who, after Campe, was the chief instrument in determining the future life of Alexander Von Humboldt. They were fast friends during the short period of their intercourse in Gottingen, and all the time they could spare from their customary

duties, was spent in each other's society. What conversations they must have had of that eventful journey round the world, and what schemes they planned for the future! The active imagination of the young student, fresh from the reading of wonderful adventures in the New World, the chronicles of Vasco Nuñes de Balboa, Pizarro, and the rest of those grand old Spaniards, was fired with the thought of making new voyages and discoveries, which should cast the old ones for ever in the shade. Voyages in the long swell of tropic seas, under constellations that never shine to European eyes: sailing along the dim outlines of the western continent, dark with the long belt of the pathless forests, or ragged with the peaks of inland mountains, capped with eternal snow: or up great rivers a thousand leagues in length, on, on, into the heart of the New World, the primeval solitudes of Nature! The best hours of a man's life are those that he wastes in dreams, and happy is he who can make them true, as Humboldt did.

But this was recreation rather than study, and as he went to the University to study, a graver mood soon succeeded. The University was rich in scientific collections, none of which were neglected by the earnest young student. When not attending the lectures of Blumenbach and Heyne, which were generally given in their own houses, he pursued his researches and experiments in the University Museum. To-day in the laboratory among its vials and crucibles, testing acids and gases, or in the botanic gardens, theorizing over tropic plants and trees: to-morrow in the anatomical room, surrounded by casts and models; and many a long night in the observatory unwinding the dances of the stars.

William meanwhile was deep in the philosophy of Kant, and the esthetic speculations of Goethe and Schiller Occasionally the brothers strolled through the city, arm in arm. Led on by their vagrant fancies they would cross into the market-place to watch the fountain splashing its broad basin; lounge on the bridge and look at the boats below; or quickening their steps they would hasten to the ramparts, and saunter up and down the shaded avenue of lime trees. If the day was beautiful, they wandered out of the city gates into the fertile valleys beyond, and perhaps clomb the Hainberg before they returned.

So passed their university life. It ended in the autumn of 1789.

It is to be regretted that we have no fuller account of the youth of Humboldt, for if there is anything interesting in the life of a great man like him, it is a minute relation of his youth. We want a living record of his sayings and doings in the ductile period of his genius: even his sports, if we can recover nothing better, will give us some insight into his character. We have presented, as the reader will perceive, the merest skeleton of the first twenty years of Humboldt's life. He may clothe it with flesh, if he pleases, we can do no more. Nor can others at this late day. It is easy to write the biographies of those who die young, they leave so many behind who recollect all that we desire to know; but when a man of genius lives to the age of ninety, as Humboldt did, and leaves no auto-biography, the sweetest time of his life is lost,

"In the dark backward and abysm of Time."

CHAPTER II.

STUDIES AND DREAMS.

In the summer of 1789, Campe, who had been for some years canon and councillor in Brunswick, determined to make a trip to Paris, to be present at the funeral of French despotism, and it was deemed advisable for William to accompany him. They arrived in Paris on the 3d of August. Not being fortunate enough while there to follow Tyranny to its grave, Campe revenged his disappointment by doing what most authors would have done in his place—he wrote patriotic letters in favor of the revolution, and attracted much attention. Alexander remained behind, probably at Gottingen, pursuing his favorite studies, and constantly corresponding with Forster, who was then at Mayence, where he was councillor and librarian of the University. The plan of the great transatlantic journey, formed a year or two before, was laid aside for a time, in order that he might study what was then a new science—Geology. He was deep in the writings of the then celebrated geologist, Abraham Gottlob Werner.

In his peculiar department of science Werner was undoubtedly the most remarkable man of his time. The son of a poor iron-worker, he commenced his career as a

mineralogist in the Mineralogical Academy of Freyberg, before he was out of his teens. From thence he went to Leipsic, where he busied himself in defining the external character of minerals, experimenting, and eventually, in 1774, publishing a work on the subject. Up to that time the descriptive language of mineralogists had been too indefinite to convey accurate information, or to enable those of different countries to understand each other. After publishing this work, which was long a manual, Werner returned to the Mineralogical Academy at Freyberg, and took charge of its noble cabinet of natural history. He lectured on mineralogy, and the art of mining, rendering the latter intelligible to all, by his simplification of the machinery, and his drawings and figures. His cabinet of minerals was unrivalled for its completeness and arrangement, numbering one hundred thousand specimens. He wrote largely in the scientific reviews of that day, the reading of which probably drew the attention of Humboldt towards him. He contributed more to extend the practical knowledge of mineralogy than any one who preceded him, although his method of classifying minerals according to their external characteristics, instead of their internal essences, if we may use the phrase, was rather empirical than scientific. His geology, too, was shallow. His observations were made on the limited portion of the earth's surface in his own vicinity, and the succession of rock-formations which he found there, extended, he reasoned, over the whole surface of the globe. A wider range of observation would have shown him, that at a little distance from Freyberg, many of his supposed universal rock-formations were not to be found, and that other rocks supply their place.

But as he was obstinate in his theory he remained ignorant of this fact. He contended for the aqueous formation of almost every kind of rock, the Neptunic theory as it was called, maintaining that even pumice stone was the production of water. He would not visit, however, the volcanic districts of Italy, and the ancient volcanoes of France, fearing perhaps that he might be led to abandon his first theory—a common fault of scientific men. Still, considering the time in which he lived, and the little that was then known of the true formation of the earth, Werner was entitled to much credit, and is still honorably mentioned as a pioneer in science. He raised the art of mining into the science of geology.

Such was Abraham Gottlob Werner, over whose multifarious writings Alexander was now poring. That they made a deep impression on him may be gathered from the fact that we find him, in company with his friend Forster, in the spring of 1790, making a mineralogical journey. Their route was to the Rhine, through Holland, and to England. While in England Forster introduced him to Sir Joseph Banks, the famous President of the Royal Society. Humboldt studied the rock-formations of the countries through which he passed, especially the basaltic rocks of the Rhine, and embodied the result in a small work which was published in that year. It was entitled, "Mineralogical Observations on some Basaltic Formations of the Rhine," and was intended to support the Neptunic theory of Werner. Forster collected materials for his *magnum opus*, "The Views of the Lower Rhine." In the meantime William, who had returned from Paris, vibrated between Erfurt, where he and the beautiful daughter of the president,

Von Dacheroden, to whom he was betrothed, were perfecting themselves in the art of Love, and Weimar, the residence of Schiller, with whom he was intimate.

Alexander sympathized with his brother in the character which he was then playing in the delightful drama of life, but showed no inclination to appear in the same *rôle* himself. It was not that he loved woman and society less, but that he loved solitude and wisdom more. Besides, had he not his great transatlantic journey to make? To do this properly it was necessary that he should have a more thorough worldly training. So while William, who was appointed councillor of legation, and assessor to the court of Berlin, went thither to familiarize himself with his duties, after which he intended to marry, Alexander, choosing the department of finance, set off for Hamburg, and entering the Commercial Academy of Busch and Ebeling, studied the practical part of book-keeping. Ere long he was initiated into its mysteries; but beyond the sense of satisfaction which the performance of a duty always gives, we suspect that he found no delight in them. Evidently he preferred the leaves of flowers, luminous with the hand-writing of Nature, to the leaves of his day-books and ledgers, with their long rows of black figures, and their monotonous horizons of red lines. And instead of worshipping gold and silver, as a true book-keeper would have done, he had a scientific weakness for the less precious metals. He still pursued his mineralogical and botanical studies. Indeed, he was so fond of the latter, that he would often take a tramp in mid winter to gather the mosses which only grow at that time.

His stay in Hamburg was short. For in addition to

his admiration for Werner, and his growing taste for mining, one of his acquaintances, Leopold Von Buch of Berlin, had gone to Freyberg to study mining under Werner, who had just published a new theory of the formation of metallic veins. This determined Alexander to vacate his high stool at the mercantile desk, and to set off for Freyberg. Before going, however, he hastened to Berlin, to enjoy for a time the society of his mother, who doubtless found the old castle of Tegel too melancholy a place to live in, since the death of her husband, and the absence of her sons. William was there, with his beloved Caroline, and his old tutor and friend, Kunth. For Kunth was one of the family, if untiring devotion to their interests could make him so.

After his trip to Berlin Alexander proceeded to Freyberg, where he remained a year, employing himself during that time in attending the lectures of Werner, in looking over his magnificent collection, and in visiting the mines in the neighbourhood. Freyberg had a fine cathedral, and several remarkable monuments and works of art, but nothing that would have led Humboldt thither except its mines. There were over a hundred of these in the country about; silver mines, copper mines, lead mines, and mines of cobalt. How the enthusiastic young mineralogist must have revelled in them!

In the spring of 1792 he was appointed assessor to the mining and smelting departments at Berlin; in the latter part of the same year he was removed to Bayreuth, as superintendent of mines, in the newly-acquired Franconian districts, and officially commissioned to remodel the mining operations there. He was general director of the mines in the principalities of Bayreuth and Anspach.

His duties were many and arduous, for in addition to his scientific labours, he superintended the erection of public institutions in these districts. Bayreuth is divided into two parts, Oberland and Unterland. The former, which came more immediately under his supervision, is a hilly region, intersected by branches of the great Fichtelberg, and rich in mines of iron and other minerals. Humboldt spent a considerable part of his time in journeying over the country, visiting the various mines, and directing the operations of the miners. He descended into the mines for the purpose of making observations on the fungi that grew in the shafts, or, pursuing his journeys, he botanized by the way. If the region was mountainous he studied the rock-formations, and speculated on the Neptunic theory of his teacher, Werner. Busy as he must have been at this time he wrote largely for the scientific journals and periodicals, contributing to them the result of his experiments on the physical and chemical laws of metallurgy, and on the susceptibility of plants, their modes of nourishment, colour, etc. He also published a work of local botany,—a "Flora of Cryptogamic Plants in the Neighbourhood of Freyberg," and dedicated it to his former teacher, Wildenow.

In 1794 he accompanied the provincial minister, Von Hardenberg, on a political mission to the Rhine. He also made several tours through the Alp districts and Silesia, and an official trip into the province of Prussia and Poland. Not being able yet to begin his great journey he contented himself with these small ones—slight studies as it were for the great picture that was to be.

In 1795 he resigned his situation as director of mines, and went to Vienna, where he renewed his passion for

botany, studying to great advantage an excellent collection of exotic plants which he found there, and enjoying the society of the geologist Freiesleben. He also studied galvanism, and made a variety of interesting experiments. He planned an excursion into Switzerland with Freiesleben, but postponed it to make an Italian journey. The war, which was then raging, confined him to Upper Italy, so that he was obliged to return without visiting the volcanic regions of Naples and Sicily.

Shortly before leaving Bayreuth he had received a letter from his brother William, who, having finished his *rôle* as a lover, had now assumed that of a husband, telling him that the health of their mother was failing. She is ill at Tegel, the letter ran—(it was dated in June, 1795)—but we, William and Caroline, will remain with her until the spring. On his return from Italy another letter reached him—one of those mournful letters which every man sooner or later receives. It bore the escutcheon of death—a black seal. There was a new grave at Tegel. His mother was dead.

In the beginning of the year 1797 he went to Jena, where his brother William was then residing. Here he found Freiesleben and Goethe. Goethe was so much interested in his studies in anatomy that he devoted the rest of his stay in Jena to that science. On his return to Weimar he wrote to Schiller: "I have spent the time with Humboldt agreeably and usefully: my natural history studies have been roused from their winter sleep by his presence." And Schiller wrote back shortly after: "Although the whole family of Humboldt, down to the servant, lie ill with ague, they still speak only of great journeys."

But sick or well, Humboldt's studies went on. He continued his experiments on galvanism, turning his attention chiefly to the laws of muscular irritation, and the disposition of the nerves of living animals when under the galvanic influence. He wrote a work on the subject, "Experiments on Nervous and Muscular Irritation," and sent it to his old teacher, Blumenbach, who published it for him, with notes and comments of his own.

The brothers went to Berlin in May to settle the family inheritance, previous to making a journey together into Italy. William's share was the old castle at Tegel, Alexander's the estate of Ringenwalde, in Neumark. He sold it to the poet Franz Von Kleist, to raise the necessary funds for his great journey.

The unsettled state of affairs in Italy preventing the contemplated journey, William and his family determined to proceed to Paris. Alexander went with them as far as Saltzburg, where he was induced to stay awhile by his friend Leopold Von Buch. Buch, who had just published a scientific work, "Outlines of a Mineralogical Description of Landeck," had been, as the reader remembers, one of his fellow-students in the Mineralogical Academy at Freyberg, and was like him a believer in the Neptunic theory of Werner. Humboldt afterwards called him "the greatest geologist of the age." A scientific trip was proposed, and the pair started off on foot, armed with their geological hammers, and a change of linen. They travelled through several cantons of Saltzburg, and Styria, and reached the Tyrolese Alps. While on this Bohemian trip Humboldt made the acquaintance of Lord Bristol, an English nobleman, who had visited the coasts of Greece and Illyria, and had planned an expedition

to Upper Egypt. The party were to be provided with astronomical instruments and able draughtsmen, and were to ascend the Nile as far as Assouan, after examining minutely the positions of the Said between Tentyris and the cataracts. The expedition was to occupy eight months. Humboldt consented to join it, on condition that he should be allowed to continue the journey over Palestine and Syria, and went to Paris to make the necessary preparations.

He arrived at Paris in the spring of 1798, and was warmly welcomed by his brother William, whose house was a rallying point for all his educated countrymen. The family led a pleasant life during their stay in the capital: gave dinner parties, esthetic teas, etc., and enjoyed themselves at the Parisian theatres. "The comedy," wrote Frau Von Humboldt, "is excellent." "My little ones would please you. Caroline grows very amiable; she is delicate, and has a rare degree of sentimentality, perfectly natural, however, as you may imagine. Her brother William is handsome, much more rough, very naughty, self-willed, and yet exceedingly good-natured. Theodore is the most amiable child I ever saw: he is stout, and almost fat, and yet looks slender; his little face has an expression of merriment, and yet his glance seems to indicate something more profound. His eyes are as if you gaze into the heavens. The white in them is quite blue, and the eyeball brown. His hair is light, and his mouth the prettiest I ever saw in a child. If you could see the boy he would make a fool of you, as he does of me."

The Humboldts were surrounded by celebrities of all sorts, artists, poets, statesmen, and *savans*. Among

others who patronised them was the celebrated Madame de Stael, who called William, who had praised her works highly, it is scarcely necessary to say, "*la plus grande capacité de l'Europe.*" Had the flattering Corinne christened Alexander so, she would not have been far from the truth.

The political aspect of Europe destroyed the plan of the Egyptian journey, as it had already done the Italian one, and Lord Bristol having been arrested at Milan, it was given up. Another scheme, however, was soon set afoot, for Humboldt now learned that the National Museum of France was preparing an expedition under the command of Captain Baudin. The purpose of this expedition was to visit the Spanish possessions of South America, from the mouth of the river Plata, to the kingdom of Quito and the isthmus of Panama. It was to visit the archipelago of the Pacific, explore the coasts of New Holland, from Van Dieman's Land to that of Nuyts, after which the vessels were to stop at Madagascar, and return by the Cape of Good Hope. Humboldt had but little confidence in Baudin, who had given cause of discontent to the court of Vienna when he was commissioned to conduct to Brazil the botanist, Van der Schott; but as he could not hope with his own resources to make a voyage of such extent, he determined to take the chances of the expedition. He obtained permission to embark, with his instruments, in one of the vessels destined for the South Sea, reserving to himself the right to leave Captain Baudin whenever he thought proper. Michaux and Bonpland were to accompany the expedition as naturalists.

The war breaking out afresh in Italy and Germany,

and the French government needing the funds for something more solid than science, it was postponed to an indefinite period. Truly this was the pursuit of travel under difficulties.

It is an ill wind however that blows nobody good. The failure of the expedition was no interruption to the friendship which Humboldt had formed with Bonpland. Aimé Bonpland, the naturalist, then in his twenty-fifth year, was a native of Rochelle, France. His father was a physician, and he studied the same profession, but the revolutionary authorities got hold of him before he could finish his studies, and made him a surgeon on a man-of-war. When peace was restored he went to Paris, and became a pupil of the celebrated Corvisart, who had established a clinical school at the hospital of La Charité. It was at this time that Humboldt and he met. They were friends at once. Understanding anatomy and botany better than Humboldt did, he gave him further instructions in those studies, receiving from him in exchange a knowledge of natural history and mineralogy.

Humboldt's friendship with Bonpland, the society that he met at the house of his brother William, and his own scientific attainments soon introduced him to the notice of the naturalists and mathematicians of Paris. He mingled with the most eminent French *savans* as their equal. He pursued his experiments before and after the failure of the expedition of Baudin, working in concert with Gay Lussac, of whom more hereafter, with whom he undertook eudiometric investigations of the chemical analysis of the atmosphere. The result of their labors was embodied in a joint production, "Researches on the Composition of the Atmosphere." He also wrote a

work on subterranean gases, the fruit of his experience in the mines of Bayreuth and Anspach.

In the autumn there was a prospect of another expedition. The Swedish consul, Skioldebrand, was at Paris on his way to embark at Marseilles, on a special mission from his government with presents to the Dey of Algiers. He had resided a long time on the coast of Africa, and being highly respected by the government of Algiers, he could, he thought, easily procure permission for Humboldt to visit the chain of the Atlas mountains. A portion of these mountains had been visited by M. Desfontaines; but no mineralogist had yet examined them. Besides this inducement the consul despatched every year a vessel for Tunis, where the pilgrims embarked for Mecca, and he promised Humboldt to convey him by this means to Egypt. The opportunity was too good to be lost. Humboldt completed his collection of instruments, and purchased works relating to the countries he intended to visit, and bidding adieu to his brother, and Frau Caroline, not forgetting the delicate Caroline, junior, the handsome but naughty William, and the amiable Theodore with his blue eyes and light hair, he repaired to Marseilles with his friend Bonpland. They impatiently awaited the Swedish frigate, which was expected at the end of October; several times a day they climbed the mountain of Notre Dame de la Garde, which commands an extensive outlook on the Mediterranean, eagerly watching every sail on the horizon. Two months passed, and no frigate came. The papers at length informed them that she had suffered severely in a storm on the coast of Portugal, and had been obliged to enter the port of Cadiz to refit.

She would not be at Marseilles till spring. Still persisting in their intention of visiting Africa, they found a small vessel of Ragusa on the point of setting sail for Tunis, and agreed with the captain for their passage. Before the vessel sailed they learned that the government of Tunis, inimical to *la grande nation*, was persecuting its residents in Barbary, and that every person coming from a French port was thrown into a dungeon. The journey was abandoned. Not to be baffled, however, they resolved to pass the winter in Spain, in hopes of embarking the next spring, either at Carthagena or Cadiz.

They crossed Catalonia and the kingdom of Valencia, visiting the ruins of Tarragona and ancient Saguntum. They made an excursion from Barcelona to Montserrat, and saw the hermits that inhabit its lofty peaks. Humboldt ascertained by astronomical observations the position of several points important for the geography of Spain, and determined by the barometer the heights of the central plain. The inclination of the needle, and the intensity of the magnetic forces came in for a share of his attention.

They arrived at Madrid in March, 1799, and Humboldt was presented to the king at Aranjuez by the minister from the court of Saxony, who was himself a mineralogist. The king received him graciously. He explained to his majesty the motives which led him to undertake his journey to the New World, and presented a memoir on the subject to the secretary of state. Don Mariano Luis de Urquijo, the minister, supported Humboldt's demand, and obtained for the travellers two passports, one from the first secretary of the state, the other from the council of the Indies. The good time had come at

last. "Never," says Humboldt, "had so extensive a permission been granted to any traveller, and never had any foreigner been honored by more confidence on the part of the Spanish government."

The *savans* of Madrid offered the travellers great inducements to stay awhile among them. Don Casimir Ortega, the abbé Pourret, and the learned authors of the Flora of Peru opened to them their rich collections. They examined part of the recently discovered plants of Mexico, from drawings which had been sent to the Museum of Natural History of Madrid, and obtained from the chemist Proust, and the mineralogist Hergen, some curious details of the mineral substances of America. They could have spent a long time usefully as well as pleasantly in the Spanish capital, but bearing in mind their previous disappointments they departed about the middle of May, *en route* for Corunna, from whence they intended to embark for Cuba. They crossed a part of Old Castile and the kingdoms of Leon and Galicia. The snow still covered the lofty granitic tops of the Guadarama, but in the deep valleys of Galicia the rocks were clothed with cistuses and arborescent heaths. Pursuing his geological researches on the way Humboldt examined the mountains between Astorga and Corunna, and found that many of them were composed of graywacke. Near Corunna he came upon granitic ridges which contained tin ore.

Arriving at Corunna they sought Don Raphael Clavijo, the superintendent of the dockyards, to whom they had recommendations from the Spanish minister, and the chief secretary of state. He advised them to embark on board the frigate Pizarro, which was soon to

sail for Cuba, in company with the Alcudia, the packet-boat of the month of May, which had been detained by an English fleet, then blockading the port in order to cut off the communication between Spain and her colonies. They concluded to follow his advice, and arrangements were made to receive their instruments on board the Pizarro. Don Raphael ordered the captain to stop at Teneriffe, as long as Humboldt should deem necessary, that the travellers might visit the port of Orotava, and ascend the peak.

It was ten days before their instruments were embarked and the vessel was ready to sail. They spent that time in preparing the plants that they had collected in the beautiful valleys of Galicia, which they were the first naturalists to explore, and in examining the fuci and mollusca, which the northwest winds had cast on the rocks. Crossing from Corunna to Ferrol, a little town on the other point of the bay, they made several experiments on the temperature of the ocean, by means of a valved thermometrical sounding lead, and found that the neighborhood of a sand bank is revealed before the lead can be made use of, by the quick decrease in the temperature of the water, and that the seaman can therefore perceive the approach of danger much sooner by the thermometer than by the lead.

The time of departure drawing near Humboldt wrote farewell letters to his friends in Germany and Paris. As before leaving Paris he had agreed with Captain Baudin, that if the expedition for discoveries in the Pacific, which seemed to be adjourned for several years, should take place at an earlier period, he would endeavor to return from Algiers and join it, at some port in

France or Spain; he now wrote him that if the government persisted in sending him by Cape Horn, he would meet him at Montevideo, Chili, or Lima, or wherever else he should touch in the Spanish colonies. This done he was ready to bid the Old World adieu.

The English squadron was still off the harbor, but a storm coming up on the 5th of June, it was obliged to quit the coast, and make for the open sea. They seized the opportunity and set sail, cheered by a pleasing prophecy, from those who saw the Pizarro weigh anchor, that they would certainly be captured in three days. They sailed at two o'clock in the afternoon. The wind was contrary, and they made several tacks before they could get out of the harbor. At half-past six they passed the lighthouse of Corunna, the famous Tower of Hercules. At sunset the wind increased, and the sea ran high. The shores of Europe lessened in the distance. The last thing they saw that night was the light of a fishing hut at Sisarga. It faded. The land disappeared. The sea was before them, the wide waste Sea!

BOOK II.

1799—1804.

CHAPTER I.

THE SEA.

At sunset on the third day they saw from the mast-head an English convoy, sailing along the coast, and steering towards the southeast. To avoid it they altered their course. From that moment no light was allowed in the great cabin, for fear of their being seen at a distance. Humboldt and Bonpland were obliged to make use of dark lanterns to examine the temperature of the water.

From the time of their sailing until they reached the 36th degree of latitude they saw no organic beings, except sea swallows and dolphins; they even looked in vain for sea-weeds and mollusca. On the sixth day however they entered a zone where the waves were covered with a prodigious quantity of medusæ. The sea was nearly becalmed, but the medusæ were bound towards the south-east, with a rapidity four times greater than that of the current.

Between the island of Madeira and the coast of Africa, they had slight breezes and dead calms, which were favorable for the magnetic observations that occupied Humboldt during the passage. The travellers were never weary of admiring the beauty of the nights;

nothing could be compared to the transparency and serenity of the African sky. They were struck with the innumerable quantity of falling stars, which appeared at every instant. The farther progress they made towards the south, the more frequent was this phenomenon, especially near the Canaries. Forty leagues east of the island of Madeira a swallow perched on the topsail yard. It was so fatigued that it suffered itself to be caught by the hand.

The Pizarro had orders to touch at the isle of Lancerota, one of the seven great Canary Islands; and at five in the afternoon of the 16th of June, that island appeared so distinctly in view that Humboldt was able to take the angle of altitude of a conic mountain, which towered majestically over the other summits.

The current drew them toward the coast more rapidly than they wished. As they advanced, they discovered at first the island of Forteventura, famous for its numerous camels; and a short time after saw the island of Lobos in the channel which separated Forteventura from Lancerota. They spent part of the night on deck. The moon illumined the volcanic summits of Lancerota, the flanks of which, covered with ashes, reflected a silver light. Antares threw out its resplendent rays near the lunar disk, which was but a few degrees above the horizon. The night was beautifully serene and cool. The phosphorescence of the ocean seemed to augment the mass of light diffused through the air. After midnight, great black clouds rising behind the volcano shrouded at intervals the moon, and the beautiful constellation of the Scorpion. They beheld lights carried to and fro on shore, which were probably those of fish-

ermen preparing for their labors. Humboldt and Bonpland had been occasionally employed during their passage, in reading the old voyages of the Spaniards, and these moving lights recalled to their fancy those which Pedro Gutierrez, page of Queen Isabella, saw in the isle of Guanahani, on the memorable night of the discovery of the New World.

On the 17th, in the morning, the horizon was foggy, and the sky slightly covered with vapor. The outlines of the mountains of Lancerota appeared stronger: the humidity, increasing the transparency of the air, seemed at the same time to have brought the objects nearer their view. They passed through the channel which divided the isle of Alegranza from Montaña Clara, taking soundings the whole way, and examined the archipelago of small islands situated northward of Lancerota. In the midst of this archipelago, which was seldom visited by vessels bound for Teneriffe, they were singularly struck with the configuration of the coasts. They thought themselves transported to the Euganean mountains in the Vicentin, or the banks of the Rhine near Bonn.

The whole western part of Lancerota bore the appearance of a country recently convulsed by volcanic eruptions. Everything was black, parched, and stripped of vegetable mould. They distinguished, with their glasses, stratified basalt in thin and steeply-sloping strata. They were forced by the winds to pass between the islands of Alegranza and Montaña Clara, and as none on board the Pizarro had sailed through this passage, they were obliged to be continually sounding.

From some notions which the captain of the Pizarro had collected in an old Portuguese itinerary, he thought

himself opposite to a small fort, situated north of Teguisa, the capital of the island of Lancerota. Mistaking a rock of basalt for a castle, he saluted it by hoisting a Spanish flag, and sent a boat with an officer to inquire of the commandant whether any English vessels were cruising in the roads. He was not a little surprised to learn that the land which he had considered as a prolongation of the coast of Lancerota, was the small island of Graciosa, and that for several leagues there was not an inhabited place. Humboldt and Bonpland took advantage of the boat to survey the land, which inclosed a large bay. The small portion of the island which they traversed resembled a promontory of lava. The rocks were naked with no marks of vegetation, and scarcely any of vegetable soil.

They re-embarked at sunset, and hoisted sail, but the breeze was too feeble to permit the Pizarro to continue her course to Teneriffe. The sea was calm; a reddish vapor covered the horizon, and seemed to magnify every object. In this solitude, amidst so many uninhabited islets, the travellers enjoyed for a long time the view of rugged and wild scenery. The black mountains of Graciosa appeared like perpendicular walls five or six hundred feet high. Their shadows, thrown over the surface of the ocean, gave a gloomy aspect to the scenery. Rocks of basalt, emerging from the bosom of the waters, wore the resemblance of the ruins of some vast edifice, and carried their thoughts back to the remote period when submarine volcanoes gave birth to new islands, or rent continents asunder. Everything which surrounded them seemed to indicate destruction and sterility; but the back-ground of the picture, the coasts of Lancerota,

presented a more smiling aspect. In a narrow pass between two hills, crowned with scattered tufts of trees, marks of cultivation were visible. The last rays of the sun gilded the corn ready for the sickle.

The captain of the Pizarro endeavored to get out of this bay by the pass which separated Alegranza from Montaña Clara, and through which he had easily entered to land at the northern point of Graciosa. The wind having fallen, the currents drove the vessel very near a rock, on which the sea broke with violence, and which was noted in the old charts under the name of Hell, or Infierno. Examined at the distance of two cables' length, this rock was found to be a mass of lava, full of cavities, and covered with scoriæ resembling coke.

As the vessel was prevented by the fall of the wind, and by the currents, from repassing the channel of Alegranza, the captain resolved on tacking during the night between the island of Clara and the West Rock. This resolution had nearly proved fatal. A calm was very dangerous near this rock, towards which the current drove with considerable force. They began to feel the effects of this current at midnight. The proximity of the stony masses, which rose perpendicularly above the water, deprived the vessel of the little wind which blew; she no longer obeyed the helm and they dreaded striking every instant.

The wind having freshened a little towards the morning of the 18th, they succeeded in passing the channel.

From the time of their departure from Graciosa the horizon continued so hazy that they did not discover the island of Canary, notwithstanding the height of its mountains, till the evening of the 18th. On the morning

of the 19th, they discovered the point of Naga; but the land, obscured by a thick mist, presented forms that were vague and confused. As they approached the road of Santa Cruz, they observed that the mist, driven by the winds, drew nearer to them. The sea was strongly agitated, as it most commonly is in those latitudes. The vessel anchored after several soundings, for the mist was so thick that they could scarcely distinguish objects at a few cables' distance; but at the moment they began to salute the place, the fog was instantly dispelled. The peak of Teyde appeared in a break above the clouds, and the first rays of the sun, which had not yet risen, illumined the summit of the volcano.

Humboldt and Bonpland hastened to the prow of the vessel to behold the magnificent spectacle, and at the same instant saw four English vessels lying to, and very near the stern. They had passed without being perceived, and the same mist which had concealed the peak from their view, had saved them from the risk of being carried back to Europe. The Pizarro stood in as close as possible to the fort, to be under its protection. It was on this shore, that, in the landing attempted by the English two years before, in July, 1797, the great Nelson had his arm carried off by a cannon ball.

Santa Cruz stands on a narrow and sandy beach. Its houses, which are of dazzling whiteness, with flat roofs, and windows without glass, are built close against a wall of black perpendicular rock, devoid of vegetation. A fine mole built of freestone, and the public walk planted with poplars, are the only objects which break the sameness of the landscape.

The recommendation of the court of Madrid pro-

cured for them the most satisfactory reception. The captain-general gave them immediate permission to examine the island, and Col. Armiaga, who commanded a regiment of infantry, received them into his house with great hospitality. They could not enough admire the banana, the papaw tree, and other plants, which they had hitherto seen only in hot-houses, cultivated in his garden in the open air. In the evening they went to herborize along the rocks, but were little satisfied with their harvest, for the drought and dust had almost destroyed vegetation. The few plants that they saw, chiefly succulent ones, which draw their nourishment from the air rather than the soil on which they grow, reminded them by their appearance, that this group of islands belonged to Africa, and even to the most arid part of that arid continent.

Though the captain of the Pizarro had orders to stop long enough at Teneriffe to give the naturalists time to scale the summit of the peak, if the snows did not prevent their ascent, they received notice, on account of the blockade of the English ships, not to expect longer delay than four or five days. They consequently hastened their departure for the port of Orotava, which was situated on the western declivity of the volcano, where they were sure of procuring guides; for they could find no one at Santa Cruz who had mounted the peak.

On the 20th of June, before sunrise, they began their excursion by ascending to the Villa de Laguna. The road by which they ascended was on the right of a torrent, which in the rainy season formed fine cascades. Near the town they met some white camels. The town itself, at which they soon arrived, was situated in a

small plain, surrounded by gardens, and protected by a hill which was crowned by a wood of laurels, myrtle, and arbutus. It was encircled by a great number of chapels. Shaded by trees of perpetual verdure, and erected on small eminences, these chapels added to the picturesque effect of the landscape. The interior of the town was not equal to its external appearance. The houses were solidly built, but very antique, and the streets seemed deserted. Our botanists, however, did not complain of the antiquity of the edifices, for the roofs and walls were covered with Canary house leek, and elegant trichomanes.

Before they reached Orotava they visited, at a little distance from the port, a botanic garden, which had been laid out at a great expense some years before by the Marquis de Nava. There they found M. Le Gros, the French vice-consul, who had often scaled the summit of the peak, and who served them as a guide.

They began their ascent on the morning of the 21st. M. Le Gros, M. Lalande, secretary to the French Consulate at Santa Cruz, and an English gardener at Durasno, joined them on this excursion. The day was not fine, for the summit of the peak, which was generally visible at Orotava from sunrise till ten o'clock, was covered with thick clouds.

They passed along a lofty aqueduct, lined with a great number of fine ferns, and visited several gardens, in which the fruit trees of the north of Europe were mingled with orange trees, pomegranate, and date trees. Here they saw the famous dragon tree of M. Franqui. Although they had been made acquainted with it, from the narratives of many travellers, they were not the less

struck with its enormous magnitude. They were told that the trunk of this tree, which is mentioned in several very ancient documents, was as gigantic in the fifteenth century as when they saw it. Its height appeared to them to be about fifty or sixty feet; its circumference near the roots was forty-five feet. The trunk was divided into a great number of branches, which rose in the form of a candelabrum, and were terminated by tufts of leaves.

On leaving Orotava, a narrow and stony pathway led them through a beautiful forest of chestnut trees to a site covered with brambles, some species of laurels, and arborescent heaths. The trunks of the latter grew to an extraordinary size, and were loaded with flowers. They now stopped to take in their provision of water under a solitary fir-tree.

They continued to ascend, till they came to the rock of La Gayta and to Portillo: traversing this narrow pass between two basaltic hills, they entered the great plain of Spartium. They spent two hours and a half in crossing the Llano del Retama, which appeared like an immense sea of sand.

As far as the rock of Gayta, or the entrance of the extensive Llano del Retama, the peak of Teneriffe was covered with beautiful vegetation. There were no traces of recent devastation. They might have imagined themselves scaling the side of some volcano, the fire of which had been extinguished for centuries; but scarcely had they reached the plain covered with pumice-stone, when the landscape changed its aspect, and at every step they met with large blocks of obsidian thrown out by the volcano. Everything here spoke perfect solitude. A few goats and rabbits bounded across the plain. The

barren region of the peak was nine square leagues; and as the lower regions viewed from this point retrograded in the distance, the island appeared an immense heap of torrefied matter, hemmed round by a scanty border of vegetation.

From the Llano del Retama they passed through narrow defiles, and small ravines hollowed at a very remote time by the torrents, first arriving at a more elevated plain, then at the place where they intended to pass the night. This station bore the name of the English Halt. Two inclined rocks formed a kind of cavern, which afforded a shelter from the winds. Though in the midst of summer, and under an African sky, they suffered from cold during the night. The thermometer descended there as low as to 41°. Their guides made up a large fire with the dry branches of retama. Having neither tents nor cloaks, Humboldt and Bonpland lay down on some masses of rock, and were incommoded by the flame and smoke, which the wind drove towards them. They had attempted to form a kind of screen with cloths tied together, but their inclosure took fire, which they did not perceive till the greater part had been consumed by the flames. As the temperature diminished, the peak became covered with thick clouds. The approach of night interrupted the play of the ascending current, which, during the day, rose from the plains towards the high regions of the atmosphere; and the air, in cooling, lost its capacity of suspending water. A strong northerly wind chased the clouds; the moon at intervals, shooting through the vapours, exposed its disk on a firmament of the darkest blue; and the view of the volcano threw a majestic character over the nocturnal scenery. Some-

times the peak was entirely hidden from tneir eyes by the fog, at other times it broke upon them in terrific proximity; and, like an enormous pyramid, threw its shadow over the clouds rolling beneath their feet.

About three in the morning, by the sombrous light of a few fir torches, they started on their journey to the summit of the Sugar-loaf. They scaled the volcano on the northeast side, where the declivities were extremely steep; and after two hours' toil reached a small plain, which, on account of its elevated position, bore the name of Alta Vista. This was the station of the *neveros*, those natives whose occupation it was to collect ice and snow, which they sold in the neighbouring towns. Their mules, better practised in climbing mountains than those hired by travellers, reach Alta Vista, and the *neveros* are obliged to transport the snow to that place on their backs. Above this point commenced the Malpays, a term by which is designated here, as well as in every other country subject to volcanoes, a ground destitute of vegetable mould, and covered with fragments of lava.

Day was beginning to dawn when the travellers left the ice-cavern. They observed, during the twilight, a phenomenon which is not unusual on high mountains, but which the position of the volcano they were scaling rendered very striking. A layer of white and fleecy clouds concealed from them the sight of the ocean, and the lower region of the island. This layer did not appear above five thousand feet high; the clouds were so uniformly spread, and kept so perfect a level, that they wore the appearance of a vast plain covered with snow. The colossal pyramid of the peak, the volcanic summits of Lancerota, of Forteventura, and the isle of Palma,

were like rocks amidst this vast sea of vapours, and their black tints were in fine contrast with the whiteness of the clouds.

While they were climbing over the broken lavas of the Malpays, they perceived a very curious optical phenomenon, which lasted some minutes. They thought they saw on the east side small rockets thrown into the air. Luminous points, about seven or eight degrees above the horizon, appeared first to move in a vertical direction; but their motion was gradually changed into a horizontal oscillation. Their fellow-travellers, their guides even, were astonished at this phenomenon, without either Humboldt or Bonpland having made any remark on it to them. The travellers thought, at first sight, that these luminous points, which floated in the air, indicated some new eruption of the great volcano of Lancerota; for they recollected that Bouguer and La Condamine, in scaling the volcano of Pichincha, were witnesses of the eruption of Cotopaxi. But the illusion soon ceased, and they found that the luminous points were the images of several stars magnified by the vapours. These images remained motionless at intervals, they then seemed to rise perpendicularly, descended sideways, and returned to the point whence they had departed. This motion lasted one or two seconds. Though they had no exact means of measuring the extent of the lateral shifting, they did not the less distinctly observe the path of the luminous point. It did not appear double from an effect of mirage, and left no trace of light behind. Bringing, with the telescope of a small sextant, the stars into contact with the lofty summit of a mountain in Lancerota, Humboldt observed that the oscillation was

constantly directed towards the same point, which was towards that part of the horizon where the disk of the sun was to appear; and that making allowance for the motion of the star in its declination, the image returned always to the same place. These appearances of lateral refraction ceased long before daylight rendered the stars quite invisible.

The road, which they were obliged to clear for themselves across the Malpays, was extremely fatiguing. The ascent was steep, and the blocks of lava rolled from beneath their feet. At the peak the lava, broken into sharp pieces, left hollows, in which they risked falling up to their waists. Unfortunately the listlessness of their guides contributed to increase the difficulty of this ascent. Models of the phlegmatic, they had wished to persuade Humboldt and Bonpland on the preceding evening not to go beyond the station of the rocks. Every ten minutes they sat down to rest themselves, and when unobserved they threw away the specimens of obsidian and pumice-stone, which the geologists had carefully collected. They discovered at length that none of the guides had ever visited the summit of the volcano.

After three hours' walking, they reached, at the extremity of the Malpays, a small plain, called La Rambleta, from the centre of which the Sugar-loaf took its rise. They had yet to scale the steepest part of the mountain, the Sugar-loaf, which formed the summit. The slope of this small cone, covered with volcanic ashes, and fragments of pumice-stone, was so steep, that it would have been almost impossible to reach the top, had they not ascended by an old current of lava, the débris of which had resisted the ravages of time. These

débris formed a wall of scorious rock, which stretched into the midst of the loose ashes. They ascended the Sugar-loaf by grasping the half-decomposed scoriæ, which often broke in their hands. They employed nearly half an hour to scale a hill, the perpendicular height of which was scarcely five hundred and forty feet.

When they gained the summit of the Sugar-loaf they were surprised to find scarcely room enough to seat themselves conveniently. They were stopped by a small circular wall of porphyritic lava, with a base of pitchstone, which concealed from them the view of the crater. The west wind blew with such violence that they could scarcely stand. It was eight in the morning, and they suffered severely from the cold, though the thermometer kept a little above freezing point.

The wall which surrounded the crater like a parapet, was so high, that it would have been impossible to reach the crater itself, if, on the eastern side, there had not been a breach, which seemed to have been the effect of a flowing of very old lava. They descended through this breach toward the bottom of the funnel, the figure of which was elliptic. The greatest breadth of the mouth appeared to them to be three hundred feet, the smallest two hundred feet.

The external edges of the crater were almost perpendicular. They descended to the bottom of the crater on a train of broken lava, from the eastern breach of the inclosure. The heat was perceptible only in a few crevices, which gave vent to aqueous vapours with a peculiar buzzing noise. Some of these funnels or crevices were on the outside of the inclosure, on the external brink of the parapet that surrounded the crater. Hum-

boldt plunged the thermometer into them, and saw it rise rapidly to 154° and 167°. He also sketched on the spot a view of the interior edge of the crater as it presented itself in the descent by the eastern track.

The top of the circular wall exhibited those curious ramifications which are found in coke. The northern edge was most elevated. Towards the south-west the enclosure was considerably sunk, and an enormous mass of scorious lava seemed glued to the extremity of the brink. The rock was perforated on the west, and a large opening gave a view of the horizon of the sea.

Seated on the brink of the crater, Humboldt dug a hole some inches deep, into which he placed the thermometer, which rapidly rose to 107°. Some sulphurous crystals which he gathered here, consumed the paper in which he wrapt them, and a part of his mineralogical journal besides.

From the outer edge of the crater the admiring travellers turned their eyes towards the north-east, where the coasts were studded with villages and hamlets. At their feet were masses of vapour constantly drifted by the winds. A uniform stratum of clouds had been pierced in several places by the effect of the small currents of air, which the earth, heated by the sun, began to send towards them. The port of Orotava, its vessels at anchor, the gardens and the vineyards encircling the town, showed themselves through an opening which seemed to enlarge every instant. From the summit of these solitary regions their eyes wandered over an inhabited world. They enjoyed the striking contrast between the bare sides of the peak, its steep declivities covered with scoriæ, its elevated plains destitute of vege-

tation, and the smiling aspect of the cultured country beneath. They beheld the plants divided by zones, as the temperature of the atmosphere diminished with the elevation of the site. Below the Sugar-loaf, lichens began to cover the scorious and lustrous lava: and violets rose on the slope of the volcano at eight thousand five hundred feet of height. Tufts of retama, loaded with flowers, adorned the valleys hollowed out by the torrents, and encumbered with the effects of the lateral eruptions. Below the retama, lay the region of ferns, bordered by the tract of the arborescent heaths. Forests of laurel, rhamnus, and arbutus, divided the ericas from the rising grounds planted with vines and fruit trees. A rich carpet of verdure extended from the plain of spartium, and the zone of the alpine plants even to the groups of the date tree and the musa, at the feet of which the ocean appeared to roll. The seeming proximity, in which, from the summit of the peak, they beheld the hamlets, the vineyards, and the gardens on the coast, was increased by the prodigious transparency of the atmosphere. In spite of the great distance, they could plainly distinguish not only the houses, the sails of the vessels, and the trunks of the trees, but they could discern the vivid colouring of the vegetation of the plains.

Notwithstanding the heat which they felt in their feet on the edge of the crater, the cone of ashes remains covered with snow during several months in winter. It was probable that under the cap of snow considerable hollows were found, like those existing under the glaciers of Switzerland, the temperature of which was constantly less elevated than that of the soil on which they reposed. The cold and violent wind, which blew from

the time of sunrise, induced them to seek shelter at the foot of the Sugar-loaf. Their hands and faces were nearly frozen, while their boots were burnt by the soil on which they walked. They descended in the space of a few minutes the Sugar-loaf which they had scaled with so much toil; and this rapidity was in part involuntary, for they often rolled down on the ashes. It was with regret that they quitted this solitude, this domain where Nature reigned in all her majesty.

They traversed the Malpays but slowly; for their feet found no sure foundation on the loose blocks of lava. Nearer the station of the rocks, the descent became extremely difficult; the compact short-swarded turf was so slippery that they were obliged to incline their bodies continually backward, in order to avoid falling. In the sandy plain of retama, the thermometer rose to 72°; and this heat seemed to them suffocating in comparison with the cold, which they had suffered from the air on the summit of the volcano. They were absolutely without water; for their guides, not satisfied with drinking clandestinely their little supply of Malmsey wine, had broken their water jars.

They at length enjoyed the refreshing breeze in the beautiful region of the arborescent erica and fern, and were enveloped in a thick bed of clouds stationary at three thousand six hundred feet above the plain. The clouds having dispersed, they remarked a phenomenon which afterwards became familiar to them on the declivities of the Cordilleras. Small currents of air chased trains of cloud with unequal velocity, and in opposite directions: they bore the appearance of streamlets of water in rapid motion and flowing in all directions, amidst a great mass of stagnant

water. As the travellers approached the town of Orotava, they met great flocks of canaries. These birds, well known in Europe and America, were in general uniformly green. Some, however, had a yellow tinge on their backs; their note was the same as that of the tame canary. Towards the close of the day they reached the port of Orotava, where they received the unexpected intelligence that the Pizarro would not set sail till the 24th or 25th. If they could have calculated on this delay, they might either have lengthened their stay on the peak, or have made an excursion to the volcano of Chahorra. As it was they passed the following day in visiting the environs of Orotava, and enjoying its agreeable society. They were present on the eve of St. John at a pastoral fête. In the beginning of the evening the slope of the volcano exhibited on a sudden a most extraordinary spectacle. The shepherds, in conformity to a custom, no doubt introduced by the Spaniards, had lighted the fires of St. John. The scattered masses of fire, and the columns of smoke driven by the wind, formed a fine contrast with the deep verdure of the forests which covered the sides of the peak. Shouts of joy resounding from afar were the only sounds that broke the silence of nature in these solitary regions.

They left the road of Santa Cruz on the 25th of June, and directed their course towards South America. They soon lost sight of the Canary Islands, the lofty mountains of which were covered with a reddish vapour. The peak alone appeared from time to time, as at intervals the wind dispersed the clouds that enveloped the Sugar-loaf. A few land birds, which had been driven to sea by the impetuosity of the wind, followed them for several days.

The wind fell gradually the farther they receded from the African coast: it was sometimes smooth water for several hours, and these short calms were regularly interrupted by electrical phenomena. Black thick clouds, marked by strong outlines, rose on the east, and it seemed as if a squall would have forced the Pizarro to hand her topsails; but the breeze freshened anew, there fell a few large drops of rain, and the storm dispersed without their hearing any thunder.

To the north of the Cape Verd Islands they met with great masses of floating seaweeds. They were the tropic grape, which grows on submarine rocks, only from the equator to the fortieth degree of north and south latitude. From the twenty-second degree of latitude, they found the surface of the sea covered with flying-fish, which threw themselves up into the air, twelve, fifteen, or eighteen feet, and fell down on the deck.

From the time they entered the torrid zone, they were never weary of admiring, at night, the beauty of the southern sky, which, as they advanced to the south, opened new constellations to their view. "We feel," says Humboldt, writing of himself at this time, "we feel an indescribable sensation when, on approaching the equator, and particularly on passing from one hemisphere to the other, we see those stars, which we have contemplated from our infancy, progressively sink, and finally disappear. Nothing awakens in the traveller a livelier remembrance of the immense distance by which he is separated from his country, than the aspect of an unknown firmament. The grouping of the stars of the first magnitude, some scattered nebulæ, rivalling in splendour the milky way, and tracts of space remarkable for

their extreme blackness, give a peculiar physiognomy to the southern sky. This sight fills with admiration even those who, uninstructed in the several branches of physical science, feel the same emotion of delight in the contemplation of the heavenly vault, as in the view of a beautiful landscape, or a majestic site. A traveller needs not to be a botanist, to recognise the torrid zone by the mere aspect of its vegetation. Without having acquired any notions of astronomy, without any acquaintance with the celestial charts of Flamstead and De la Caille, he feels he is not in Europe, when he sees the immense constellation of the Ship, or the phosphorescent Clouds of Magellan, arise on the horizon. The heavens and the earth, everything in the equinoctial regions, presents an exotic character."

The lower regions of the air were loaded with vapours for some days. They saw distinctly for the first time the Southern Cross only on the night of the 4th of July, in the sixteenth degree of latitude. It was strongly inclined, and appeared from time to time between the clouds, the centre of which, furrowed by uncondensed lightnings, reflected a silvery light.

The pleasure the travellers felt on discovering the Southern Cross was warmly shared by those of the crew who had visited the colonies. In the solitude of the seas we hail a star as a friend, from whom we have long been separated. The Portuguese and the Spaniards are peculiarly susceptible of this feeling; a religious sentiment attaches them to this constellation, the form of which recalls the sign of the faith planted by their ancestors in the deserts of the New World.

The two great stars which mark the summit and the

foot of the Cross having nearly the same right ascension, it follows that the constellation is almost perpendicular at the moment when it passes the meridian. This circumstance is known to the people of every nation situated beyond the tropics, or in the southern hemisphere. It has been observed at what hour of the night, in different seasons, the Cross is erect or inclined. It is a timepiece which advances very regularly nearly four minutes a day, and no other group of stars affords to the naked eye an observation of time so easily made. Often afterward did Humboldt and Bonpland hear their guides exclaim in the savannahs of Venezuela, or in the desert extending from Lima to Truxillo, "Midnight is past, the Cross begins to bend!" It reminded them of that affecting scene, where Paul and Virginia, seated near the source of the river of Lataniers, conversed together for the last time, and where the old man, at the sight of the Southern Cross, warned them that it was time to separate.

The last days of their passage were not so felicitous as the mildness of the climate and the calmness of the ocean had led them to hope. The dangers of the sea did not disturb them, but the germs of a malignant fever became manifest on board the Pizarro, as they drew near the Antilles. Between decks the ship was excessively hot, and very much crowded. From the time they passed the tropic, the thermometer stood at 93° or 97°. Two sailors, several passengers, two negroes from the coast of Guinea, and a mulatto child, were attacked with a disorder which appeared to be epidemic.

On the morning of the 13th high land was seen from the masthead, though not clearly, as it was surrounded

with a thick fog. The wind blew hard, and the sea was very rough. Large drops of rain fell at intervals, and every indication menaced tempestuous weather. When the sun rose, and the fog cleared away, they saw the island of Tobago. It was a heap of rocks carefully cultivated. The dazzling whiteness of the stone formed an agreeable contrast to the verdure of some scattered tufts of trees. Cylindric and very lofty cactuses crowned the top of the mountains, and gave a peculiar physiognomy to this tropical landscape. The wind slackened after sunset, and the clouds disappeared as the moon reached the zenith. The number of falling stars was considerable on this and the following nights.

The malady which had broken out on board the Pizarro had made rapid progress, from the time when they approached the coasts of Terra Firma; but having nearly reached the end of their voyage, they flattered themselves that all who were sick would be restored to health, as soon as they could land them at the island of St. Margareta, or the port of Cumana.

This hope was not destined to be realized. The youngest of the passengers attacked with the malignant fever fell a victim to the disease. He was an Asturian, nineteen years of age, the only son of a poor widow. Several circumstances rendered the death of this young man affecting. He had embarked against his own inclination; and his mother, whom he had hoped to assist by the produce of his efforts, had made a sacrifice of her affection in the hope of securing the fortune of her son, by sending him to the colonies to a rich relation, who resided at the island of Cuba. The unfortunate young man expired on the third day of his illness, having fallen

from the beginning into a lethargic state interrupted only by fits of delirium. Another Asturian, still younger, did not leave for one moment the bed of his dying friend; still he did not contract the disorder.

Humboldt and Bonpland assembled on the deck, absorbed in melancholy reflections. It was no longer doubtful, that the fever which raged on board had assumed within the last few days a fatal aspect. Their eyes were fixed on a hilly and desert coast on which the moon, from time to time, shed her light athwart the clouds. The sea, gently agitated, emitted a feeble phosphoric light. Nothing was heard but the monotonous cry of a few large sea-birds, flying towards the shore. A profound calm reigned over these solitary regions, but this calm of nature was in discordance with the painful feelings by which they were oppressed. About eight o'clock the dead man's knell slowly tolled. The sailors suspended their labours, and threw themselves on their knees to offer a momentary prayer. All were united in one common sorrow for a misfortune which was felt to be common to all. The corpse was brought upon deck during the night, but the priest entreated that it might not be committed to the waves till after sunrise, that the last rites might be performed, according to the usage of the Romish church. There was not an individual on board, who did not deplore the death of this young man, whom they had beheld, but a few days before, full of cheerfulness and health.

Most of the passengers considered the vessel infected, and resolved to leave her at the first place at which she might touch; among these were Humboldt and Bonpland. It was not that they feared the fever, but

not wishing to visit Mexico until they had made some sojourn on the coasts of Venezuela and Paria, they thought it best to land at Cumana. Humboldt was anxious to behold in their native site the beautiful tropic plants which he had seen in the conservatory at Vienna.

On the morning of the 15th they perceived a very low islet, covered with a few sandy downs, on which they could discover with their glasses no trace of habitation or culture. Cylindrical cactuses rose here and there in the form of candelabra. The soil, almost destitute of vegetation, seemed to have a waving motion, in consequence of the extraordinary refraction which the rays of the sun underwent in traversing the strata of air in contact with plains strongly heated. Under every zone, deserts and sandy shores appear like an agitated sea, from the effect of mirage.

The coasts, seen at a distance, were like clouds, in which each observer met the form of the objects that occupied his imagination. The bearings of the vessel, and the chronometer being at variance with the charts which they had to consult, the crew and the passengers were lost in vain conjectures. Some took mounds of sand for Indian huts, and pointed out the place where they alleged the fort of Pampatar was situated; others saw herds of goats, which were common in the dry valley of St. John; or descried the lofty mountains of Macanao, which seemed to them partly hidden by the clouds. The captain resolved to send a pilot on shore, and the men were preparing to get out the long-boat when two canoes were perceived sailing along the coast. The vessel fired a gun as a signal for them, and hoisted

Spanish colours, but they drew near with distrust. These canoes, like all those in use among the natives, were constructed of the single trunk of a tree. In each canoe there were eighteen Guayqueria Indians, naked to the waist, and of very tall stature. They had the appearance of great muscular strength, and the colour of their skin was something between brown and copper-colour. Seen at a distance, standing motionless, and projected on the horizon, they might have been taken for statues of bronze. When they were near enough for those on board the Pizarro to hail them, which they did in Spanish, they threw off their mistrust and came on board. They had left the port of Cumana, they said, during the night, and were going in search of timber to the cedar forests, which extended from Cape San Jose to beyond the mouth of Rio Carupano. They gave Humboldt some fresh cocoa-nuts, and some beautifully coloured fish. What riches to his eyes were contained in the canoes of these poor Indians! Broad spreading leaves, covered bunches of plantains. The scaly cuirass of an armadillo, the fruit of the calabash tree, used as a cup by the natives, productions common in the cabinets of Europe, had a peculiar charm for him, because they reminded him that, having reached the torrid zone, he had attained the end to which his wishes had been so long directed.

The master of one of the canoes came on board as pilot, and the Pizarro weighed anchor towards evening. They soon came in sight of the little island of Cubagua, formerly celebrated for its pearl fisheries, but now entirely deserted. There being but little wind, however, the captain stood off and on till daybreak. Humboldt and Bonpland passed a part of the night on deck, con-

versing with the Indian pilot respecting the animals and plants of his country.

At daybreak on the 16th of July, 1799, forty-one days after their departure from Corunna, they beheld a verdant coast of picturesque aspect. The mountains of New Andalusia, half-veiled by mists, bounded the horizon to the south. The city of Cumana and its castle appeared between groups of cocoa-trees. They anchored in the port about nine in the morning: the sick dragged themselves on deck to enjoy the sight of a land which was to put an end to their sufferings. The eyes of the naturalists were fixed on the groups of cocoa-trees which bordered the river: their trunks, more than sixty feet high, towered over every object in landscape. The plain was covered with tufts of Cassia, Caper, and arborescent mimosas, which spread their branches in the form of an umbrella. The pinnated leaves of the palms were conspicuous on the azure sky, the clearness of which was unsullied by any trace of vapour. The sun was ascending rapidly towards the zenith. A dazzling light was spread through the air, along the whitish hills, which were strewed with cactuses, and over a sea ever calm, the shores of which were peopled with brown pelicans, egrets, and flamingoes. The splendour of the day, the vivid colouring of the vegetable world, the forms of the plants, the varied plumage of the birds, everything was stamped with the grand character of nature in the equinoctial regions.

CHAPTER II.

ABOUT CUMANA.

THE captain of the Pizarro conducted Humboldt and Bonpland to Don Vincente Emparan, the governor of the province, that they might present to him the passports which had been furnished them by the Secretary of State at Madrid. He received them with much cordiality, and expressed his great satisfaction at the resolution they had taken to remain for some time in the province, which at that period was but little known, even by name, in Europe. Señor Emparan was a lover of science, and the public marks of consideration which he gave them during a long abode in his government, contributed greatly to procure them a favourable welcome in every part of South America.

The city of Cumana occupied the ground lying between the castle of San Antonio, and the small rivers of Manzanares and Santa Catalina. The banks of the Manzanares were very pleasant, and were shaded by mimosas, erythrinas, ceibas, and other trees of gigantic growth. The children of Cumana passed a considerable part of their lives in its waters; all the inhabitants, even the women of the most opulent families, knew how to swim; and in a country where man was so near the state

of nature, one of the first questions asked on meeting in the morning was, whether the water was cooler than it was on the preceding evening. One of the modes of bathing was curious. Every evening Humboldt and Bonpland visited a family in the suburb of the Guayquerias. In a fine moonlight night, chairs were placed in the water; the men and women were lightly clothed, and the family and strangers, assembled in the river, passed some hours in smoking cigars, and in talking, according to the custom of the country, of the extreme dryness of the season, of the abundant rains in the neighbouring districts, and particularly of the extravagances of which the ladies of Cumana accused those of Caracas and Havanna. The company were luckily under no apprehensions from the small crocodiles, which were then extremely scarce, and which approached men without attacking them. These animals are three or four feet long. Humboldt never met with them in the Manzanares, but found a great number of dolphins, which sometimes ascended the river in the night, and frightened the bathers by spouting water.

The situation of the house which Humboldt and Bonpland occupied was highly favourable for the observation of the stars and meteorological phenomena. The view from it by day, however, was by no means pleasant to them; for a part of the great square on which it faced was surrounded with arcades, above which was one of those long wooden galleries, common in warm countries. This was the place where slaves were sold. The slaves exposed to sale were young men from fifteen to twenty years of age. Every morning cocoa-nut oil was distributed among them, with which they rubbed their

bodies, to give their skins a black polish. The persons who came to purchase examined the teeth of these slaves, to judge of their age and health, forcing open their mouths as if they had been horses in a market.

The first excursion of the travellers was to the peninsula of Araya. They embarked on the Rio Manzanares on the 19th of August, about two in the morning. The principal objects of this excursion were, to see the ruins of the castle of Araya, to examine the salt-works, and to make a few geological observations on the mountains forming the narrow peninsula of Maniquarez. The night was delightfully cool; swarms of phosphorescent insects glistened in the air, and over the groves of mimosa which bordered the river.

When, on descending the river, they drew near plantations, they saw bonfires kindled by the negroes. A light and undulating smoke rose to the tops of the palm-trees, and imparted a reddish hue to the disk of the moon. It was on a Sunday night, and the slaves were dancing to the music of the guitar. The bark in which they passed the gulf of Cariaco was very spacious. Large skins of the jaguar, or American tiger, were spread for their repose during the night. Though they had been scarcely two months yet in the torrid zone, they had already become so sensible to the smallest variation of temperature that the cold prevented them from sleeping.

They landed at Araya, and examined the salt-works, and having finished their operations, departed at sunset to sleep at an Indian hut, some miles distant, near the ruins of the castle of Araya. Night overtook them while they were in a narrow path, bordered on one side by the sea, and on the other by a range of perpendicular

rocks. The tide was rising rapidly, and narrowed the road at every step. They at length arrived at the foot of the old castle of Araya, where they enjoyed a prospect that had in it something melancholy and romantic. The ruins stood on a bare and arid mountain, which was crowned with agave, cactus, and thorny mimosas, and bore less resemblance to the works of man, than to masses of rock which were ruptured at the early revolutions of the globe.

Among the mulattoes, whose huts surrounded the salt lake, they found a shoemaker of Castilian descent. He received them with an air of gravity and self-sufficiency. He was employed in stretching the string of his bow, and sharpening his arrows to shoot birds. His trade of a shoemaker was not very lucrative in a country where the greater part of the inhabitants went barefooted; and he complained that, on account of the dearness of European gunpowder, a man of his quality was reduced to employ the same weapons as the Indians. He was the sage of the plain; he understood the formation of the salt by the influence of the sun and full moon, the symptoms of earthquakes, the marks by which mines of gold and silver were discovered, and the medicinal plants, which he classified into *hot and cold.* Having collected the traditions of the country, he gave them some curious accounts of the pearls of Cubagua, objects of luxury, which he treated with the utmost contempt. To show the travellers how familiar to him were the sacred writings he took a pride in reminding them that Job preferred wisdom to all the pearls of the Indies. His philosophy was circumscribed to the narrow circle of the wants of life. The possession of a very strong

ass, able to carry a heavy load of plantains to the landing-place, was the consummation of all his wishes.

After a long discourse on the emptiness of human greatness, he drew from a leathern pouch a few very small opaque pearls, which he forced Humboldt to accept, enjoining him at the same time to note on his tablets that a poor shoemaker of Araya, but a white man, and of noble Castilian race, had been enabled to give him something which, on the other side of the sea, was sought for as very precious.

In the morning the son of their Indian host conducted them to the village of Maniquarez. On their way they examined the ruins of Santiago, the structure of which was remarkable for its extreme solidity. The walls of freestone, five feet thick, had been blown up by mines; but they still found masses of seven or eight hundred feet square, which had scarcely a crack in them. Their guide showed them a cistern, thirty feet deep, which, though much damaged, furnished water to the inhabitants of the peninsula of Araya.

After having examined the environs of Maniquarez, they embarked at night in a fishing-boat for Cumana. The small crazy boats employed by the natives here, bore testimony to the extreme calmness of the sea in these regions. The boat of the travellers, though the best they could procure, was so leaky, that the pilot's son was constantly employed in baling out the water with a calabash shell.

Their first visit to the peninsula of Araya was soon succeeded by an excursion to the mountains of the missions of the Chayma Indians.

On the 4th of September, at five in the morning, they

began their journey. On account of the extreme difficulties of the road, they had been advised to reduce their baggage to a very small bulk. Two beasts of burden were sufficient to carry their provision, their instruments, and the paper necessary to dry their plants. The morning was deliciously cool. The road, which led to Cumanacoa, ran along the right bank of the Manzanares, passing by the hospital of the Capuchins. On leaving Cumana they enjoyed during the short duration of the twilight, from the top of the hill of San Francisco, an extensive view over the sea, the plain covered with golden flowers, and the mountains of the Brigantine.

After walking two hours, they arrived at the foot of the high chain of the interior mountains, which stretched from east to west; from the Brigantine to the Cerro de San Lorenzo. There, new rocks appeared, and with them another aspect of vegetation. Every object assumed a more majestic and picturesque character. The soil, watered by springs, was furrowed in every direction; trees of gigantic height, covered with lianas, rose from the ravines; their bark, black and burnt by the double action of the light and the oxygen of the atmosphere, contrasted with the fresh verdure of the pothos and dracontium, the tough and shining leaves of which were sometimes several feet long.

From the top of a hill of sandstone, they had a magnificent view of the sea, of Cape Macanao, and the peninsula of Maniquarez. At their feet an immense forest extended to the edge of the ocean. The tops of the trees, intertwined with lianas, and crowned with long wreaths of flowers, formed a vast carpet of verdure, the dark tint of which augmented the splendour of the aerial light.

In proportion as they penetrated into the forest the barometer indicated the progressive elevation of the land. The trunks of the trees here presented a curious phenomenon, for a gramineous plant, like a liana, eight or ten feet high, formed festoons, which crossed the path, and swung about with the wind. They halted in the afternoon, on a small flat, known by the name of Quetepe. A few small houses had been erected near a spring, well known by the natives for its coolness and great salubrity. They found the water delicious.

As they advanced toward the south-west, the soil became dry and sandy. They climbed a group of mountains, which separated the coast from the vast plains, or savannahs, bordered by the Orinoco. That part of the group, over which passed the road to Cumanacoa, was destitute of vegetation, and had steep declivities both on the north and the south. It was known by the name of the Imposible, because it was believed that, in the case of hostile invasion, this ridge of mountains would be inaccessible to the enemy, and would offer an asylum to the inhabitants of Cumana. The view from the Imposible was finer and more extensive than that from the table-land of Quetepe. Humboldt distinguished clearly by the naked eye the flattened top of the Brigantine, the landing-place, and the roadstead of Cumana. The rocky coast of the peninsula of Araya was discernible in its whole length. The travellers were particularly struck with the extraordinary configuration of a port, known by the name of Laguna Grande. A vast basin, surrounded by high mountains, communicated with the gulf of Cariaco by a narrow channel which admitted of the passage of only one ship at a time.

This port was capable of containing several squadrons at once. It was an uninhabited place, but annually frequented by vessels, which carried mules to the West India Islands. Humboldt traced the sinuosities of this arm of the sea, which, like a river, had dug a bed between perpendicular rocks destitute of vegetation. The prospect here reminded him of the fanciful landscape which Leonardo da Vinci has made the back-ground of his famous portrait of Mona Lisa, the wife of Francisco del Giacondo.

The *Llaneros*, or inhabitants of the plains, sent their produce, especially maize, leather, and cattle, to the port of Cumana by the road over the Imposible. Humboldt and Bonpland continually saw mules arrive, driven by Indians, or mulattoes. Several parts of the vast forest, which surrounded the mountain, had taken fire; and the reddish flames, half enveloped in clouds of smoke, presented a grand spectacle. The inhabitants frequently set fire to the forests, to improve the pasturage, and to destroy the shrubs that choked the grass. Enormous conflagrations, too, were often caused by the carelessness of the Indians, who neglect, when they travel, to extinguish the fires by which they dress their food.

They left the Imposible early in the morning of the 5th of September. The path was dangerous for their beasts, being in most places but fifteen inches broad, and bordered by precipices. When they quitted it it was to enter a thick forest, traversed by many small rivers. They walked for some hours in the shade of this forest, with scarcely a glimpse of the sky.

In this place they were struck for the first time with the sight of nests in the shape of bottles, or small bags,

suspended from the branches of the lowest trees, and attesting the wonderful industry of the orioles, that mingled their warbling with the hoarse cries of the parrots and the macaws. They left the forests, and taking a narrow path with many windings, came into an open, but humid country. Here the evaporation caused by the action of the sun was so great that they were wet as with a vapour bath. The road was bordered with a kind of bamboo, more than forty feet in height. Nothing could exceed its elegance. Its smooth and glossy trunk generally bent towards the banks of rivulets, and it waved with the lightest breath of air.

The road led them to the small village of San Fernando, which was situated in a narrow plain, and surrounded by steep rocks. This was the first mission they saw in America. The huts of the Chayma Indians, though separated from each other, were not surrounded by gardens. The streets, which were wide and very straight, crossed each other at right angles. The walls of the huts were made of clay, strengthened by lianas. The uniformity of these huts, the grave and taciturn air of their inhabitants, and the extreme neatness of the dwellings reminded Humboldt of the establishments of the Moravian Brethren. Besides their own gardens, every Indian family helped to cultivate the garden of the community, which was situated at some distance from the village. In this garden the adults of each sex worked one hour in the morning, and one in the evening. The great square of San Fernando, in the centre of the village, contained the church, the dwelling of the missionary, and a very humble-looking edifice pompously called the king's house. This was a caravanserai, des-

tined for lodging travellers; and, as our travellers often experienced, infinitely valuable in a country where the name of an inn was unknown.

The missionary of San Fernando was a Capuchin, a native of Aragon, far advanced in years, but strong and healthy. His extreme corpulency, his hilarity, the interest he took in battles and sieges, ill accorded with the ideas we form of the melancholy reveries and the contemplative life of missionaries. Though extremely busy about a cow which was to be killed next day, the old monk received Humboldt and Bonpland with kindness, and permitted them to hang up their hammocks in a gallery of his house. Seated, without doing anything, the greater part of the day, in an arm-chair of red wood, he complained bitterly of what he called the indolence and ignorance of his countrymen. The sight of Humboldt's instruments, and books, and the dried plants of Bonpland drew from him a sarcastic smile; and he acknowledged, with the naïveté peculiar to the inhabitants of those countries, that of all the enjoyments of life, without excepting sleep, none was comparable to the pleasure of eating good beef.

In the village of Arenas, at which they next arrived, lived a labourer, Francisco Lozano, who presented a curious physiological phenomenon. This man had suckled a child with his own milk. The mother having fallen sick, the father, to quiet the infant, took it into bed, and pressed it to his bosom. Lozano, then thirty-two years of age, had never before remarked that he had milk: but the irritation of the nipple, sucked by the child, caused the accumulation of that liquid. The milk was thick and very sweet. Astonished at the increased size

of his breast, the father suckled his child two or three times a day during five months. He drew on himself the attention of his neighbours, but he never thought, as he probably would have done in Europe, of deriving any advantage from the curiosity he excited. Humboldt and Bonpland saw the certificate, which had been drawn up on the spot, to attest this remarkable fact, eye-witnesses of which were then living. They assured them that, during this suckling, the child had no other nourishment than the milk of his father. Lozano, who was not at Arenas during their journey in the missions, came to them afterwards at Cumana. He was accompanied by his son, then thirteen or fourteen years of age. Bonpland examined with attention the father's breasts, and found them wrinkled like those of a woman who has given suck. He observed that the left breast in particular was much enlarged; which Lozano explained from the circumstance, that the two breasts did not furnish milk in the same abundance. Don Vicente Emparan sent a circumstantial account of this phenomenon to Cadiz.

As they approached the southern bank of the basin of Cumanacoa, they enjoyed the view of the Turimiquiri. An enormous wall of rocks, the remains of an ancient cliff, rose in the midst of the forests. Farther to the west, at Cerro del Cuchivano, the chain of mountains seemed as if broken by the effects of an earthquake. The crevice, which was more than nine hundred feet wide, was surrounded by perpendicular rocks, and filled with trees, the interwoven branches of which found no room to spread. It appeared like a mine opened by the falling in of the earth. Two caverns opened into this

crevice, whence at times there issued flames which might be seen at a great distance in the night; judging by the elevation of the rocks, above which these fiery exhalations ascended, Humboldt was led to think that they rose several hundred feet.

In an excursion which they made at Rinconado the travellers attempted to penetrate into the crevice, wishing to examine the rocks which seemed to contain in their bosom the cause of these extraordinary conflagrations; but the strength of the vegetation, the interweaving of the lianas, and thorny plants, hindered their progress. Happily the inhabitants of the valley themselves felt a warm interest in their researches, less from the fear of a volcanic explosion, than because their minds were impressed with the idea that the crevice contained a gold mine; and although the travellers expressed their doubts of the existence of gold in a secondary limestone, they insisted on knowing "what the German miner thought of the richness of the vein." Ever since the time of Charles V. and the government of the Welsers, the Alfingers, and the Sailers, at Coro and Caracas, the people of Terra Firma had entertained a great confidence in the Germans with respect to all that related to the working of mines. Wherever Humboldt went in South America, when the place of his birth was known, he was shown samples of ore. In these colonies every Frenchman was supposed to be a physician, and every German a miner.

The farmers, with the aid of their slaves, opened a path across the woods to the first fall of the Rio Juagua; and on the 10th of September Humboldt and Bonpland made their excursion to the crevice. On entering it they

recognised the proximity of tigers by a porcupine recently embowelled. For greater security the Indians returned to the farm, and brought back some dogs of a very small breed. The travellers were assured that in the event of meeting a jaguar in a narrow path he would spring on the dog rather than on a man. They did not proceed along the brink of the torrent, but on the slope of the rocks which overhung the water. They walked on the side of a precipice from two to three hundred feet deep, on a kind of very narrow cornice; when the cornice was so narrow that they could find no place for their feet they descended into the torrent, crossed it by fording, and then climbed the opposite wall. These descents were very fatiguing, and it was not safe to trust to the lianas, which hung like great cords from the tops of the trees. The creeping and parasite plants clung but feebly to the branches which they embraced; the united weight of their stalks was considerable, and the travellers ran the risk of pulling down a whole mass of verdure, if, in walking on a sloping ground, they supported their weight by the lianas. The farther they advanced the thicker the vegetation became. In several places the roots of the trees had burst the rock, by inserting themselves into the clefts that separated the beds. They had some trouble to carry the plants which they gathered at every step. The cannas, the heliconias with fine purple flowers, the costuses, and other plants of the amomum family, attained here eight or ten feet in height; and their fresh tender verdure, their silky gloss, and the extraordinary development of the parenchyma, formed a striking contrast with the brown colour of the arborescent ferns, the foliage of which was delicately shaped

The Indians made incisions with their large knives in the trunks of the trees, and fixed Humboldt's attention on the beautiful red and gold-coloured woods.

The supposed gold mine of this crevice, which was the object of their examination, was nothing but an excavation cut into a black strata of marl, which contained pyrites in abundance. The marly strata crossed the torrent, and, as the water washed out metallic grains, the natives imagined, on account of the brilliancy of the pyrites, that the torrent bore down gold. Nor could Humboldt convince them to the contrary; for they continued to pick up secretly, every bit of pyrites they saw sparkling in the water. The melancholy proverb, "All that glitters is not gold," seemed never to have reached them. Leaving this mythical gold mine they followed the course of the crevice which stretched along a narrow canal, overshadowed by lofty trees.

They had suffered great fatigue, and were quite drenched by frequently crossing the torrent, when they reached the caverns. A wall of rock rose there perpendicularly to the height of five thousand feet. In the middle of this section, and in a position unfortunately inaccessible to man, two caverns opened in the form of crevices. The naturalists were assured by their guides that they were inhabited by nocturnal birds. The party reposed at the foot of the cavern where the flames were seen to issue. The natives discussed the danger to which the town of Cumanacoa would be exposed in case the crevice should become an active volcano, while Humboldt and Bonpland speculated on the causes of the phenomenon. So ended the expedition.

On the 12th of September they continued their jour-

ney to the convent of Caripe, the principal settlement of the Chayma missions. Their first stopping-place was a solitary farm, situated on a small plain among the mountains of Cocallar.

Nothing could be compared to the majestic tranquillity which the aspect of the firmament presented in this solitary region. Tracing with the eye, at nightfall, the meadows which bounded the horizon, the plain covered with verdure and gently undulated, they thought they beheld from afar the surface of the ocean supporting the starry vault of Heaven. The tree under which they were seated, the luminous insects flying in the air, the constellations which shone in the south; every object seemed to tell them how far they were from their native land. If amidst this exotic nature they heard from the depth of the valley the tinkling of a bell, or the lowing of herds, the remembrance of their country was awakened suddenly. The sounds were like distant voices resounding from beyond the ocean, and with magical power transporting them from one hemisphere to the other.

On the following morning they made the ascent of the Turimiquiri. The view on this mountain was vast and picturesque. From the summit to the ocean they perceived chains of mountains extended in parallel lines from east to west, and bounding longitudinal valleys. These valleys were intersected at right angles by an infinite number of small ravines scooped out by the torrents. The ground in general was a gentle slope as far as the Imposible; farther on the precipices became bold, and continued so to the shore of the gulf of Cariaco. They seemed to look down into the bottom of a funnel, in which they could distinguish, amidst tufts of scattered

trees, the Indian village of Aricagua. Towards the north, a narrow slip of land, the peninsula of Araya formed a dark stripe on the sea, which, being illumined by the rays of the sun, reflected a strong light. Beyond the peninsula the horizon was bounded by Cape Macanao, the black rocks of which rose amid the waters like an immense bastion.

At last the travellers reached the convent of Caripe. It was backed with an enormous wall of perpendicular rock, covered with thick vegetation: the stone, which was of resplendent whiteness, appeared only here and there between the foliage. In a small square in front of the convent was a cross of Brazil wood, surrounded with benches for the infirm monks. They were telling their beads when Humboldt and Bonpland arrived.

They were received with great hospitality by the monks of Caripe. The building had an inner court, surrounded by an arcade, like the convents in Spain. This inclosed place was highly convenient for setting up their instruments and making observations. They found a numerous society in the convent. Young monks, recently arrived from Spain, were just about to settle in the Missions, while old infirm missionaries sought for health in the fresh and salubrious air of the mountains of Caripe. Humboldt was lodged in the cell of the superior, which contained a pretty good collection of books. He found there the *Teatro Critico* of Feijoo, the *Lettres Edifiantes*, and the *Traité d'Electricité* by abbé Nollet. It seemed as if the progress of knowledge had advanced even in the forests of America.

But that which conferred the most celebrity on the valley of Caripe, was the great Cavern of the Guacharo.

In a country where the people loved the marvellous, a cavern which gave birth to a river, and was inhabited by thousands of nocturnal birds, the fat of which was employed in the Missions to dress food, was an everlasting object of conversation and discussion. The cavern, which the natives called "a mine of fat," was not in the valley of Caripe itself, but three short leagues distant from the convent.

Humboldt and Bonpland set out for it on the 18th of September, acompanied by the alcaldes, or Indian magistrates, and the greater part of the monks of the convent. A narrow path led them at first towards the south, across a fine plain, covered with beautiful turf. They then turned westward, along the margin of a small river which issued from the mouth of the cavern. They ascended sometimes in the water, which was shallow, sometimes between the torrent and a wall of rocks, on a soil extremely slippery and miry. The falling down of the earth, the scattered trunks of trees, over which the mules could scarcely pass, and the creeping plants that covered the ground, rendered this part of the road fatiguing. They were within four hundred paces of the cavern, and yet they could not perceive it. The torrent ran in a crevice hollowed out by the waters, and they went on under a cornice, the projection of which prevented them from seeing the sky. The path wound in the direction of the river; and at the last turning they came suddenly before the immense opening of the grotto. Pierced in the vertical profile of a rock, the entrance faced the south, and formed an arch eighty feet broad, and seventy-two feet high. The rock which surmounted the grotto was covered with trees

of gigantic height. Plants rose in its clefts, and creeping vines, waving in the wind, were interwoven in festoons before the mouth of the cavern. Nor did this luxury of vegetation embellish the external arch merely; it appeared even in the vestibule of the grotto. They saw with astonishment plantain-leaved heliconias eighteen feet high, the praga palm-tree, and arborescent arums, following the course of the river, even to those subterranean places. The vegetation continued in the cave of Caripe, and did not disappear till, penetrating into the interior, they had advanced thirty or forty paces from the entrance. They measured the way by means of a cord, and went on about four hundred and thirty feet without being obliged to light their torches. Daylight penetrated far into this region, because the grotto formed but one single channel, keeping the same direction. Where the light began to fail, they heard from afar the hoarse sounds of the nocturnal birds.

The noise of these birds was horrible. Their shrill and piercing cries struck upon the vaults of the rocks, and were repeated by the subterranean echoes. The Indians showed the travellers the nests of the guacharos by fixing a torch to the end of a long pole. These nests were fifty or sixty feet high above their heads, in holes in the shape of funnels, with which the roof of the grotto was pierced like a sieve. The noise increased as they advanced, and the birds were scared by the light of the torches. When this noise ceased for a few minutes around them, they heard at a distance the plaintive cries of the birds roosting in other ramifications of the cavern. It seemed as if different groups answered each other alternately.

The Indians were in the habit of entering this cavern

once a year, near midsummer. They went armed with poles, with which they destroyed the greater part of the nests. At that season several thousand birds were killed; and the old ones, as if to defend their brood, hovered over the heads of the Indians, uttering terrible cries. The young, which fell to the ground, were opened on the spot for their fat.

At the period commonly called, at Caripe, the oil harvest, the Indians built huts with palm-leaves, near the entrance, and even in the porch of the cavern. There, with a fire of brushwood, they melted in pots of clay the fat of the young birds just killed. This fat was known by the name of the butter of the guacharo.

As the travellers continued to advance into the cavern, they followed the banks of the river which issued from it, and was from twenty-eight to thirty feet wide. They walked on the banks, as far as the hills formed of calcareous incrustations permitted them. Where the torrent wound among high masses of stalactites, they were often obliged to descend into its bed, which was only two feet deep. They learned that this subterranean rivulet was the origin of the river Caripe, which, at the distance of a few leagues, where it joined the small river of Santa Maria, was navigable for canoes. They found on the banks of the subterranean rivulet a great quantity of palm-tree wood, the remains of trunks, on which the Indians climbed to reach the nests hanging from the roofs of the cavern. The rings formed by the vestiges of the old footstalks of the leaves, furnished as it were the steps of a ladder perpendicularly placed.

They had great difficulty in persuading the Indians to pass beyond the anterior portion of the grotto, the only

part which they annually visited to collect the fat. The whole authority of the monks was necessary to induce them to advance as far as the spot where the torrent formed a small subterranean cascade. The natives connected mystic ideas with this cave, inhabited by nocturnal birds; they believed that the souls of their ancestors sojourned in the deep recesses of the cavern. "Man," said they, "should avoid places which are enlightened neither by the sun nor by the moon." "To go and join the guacharos," was with them a phrase signifying to rejoin their fathers, to die. The magicians and the poisoners performed their nocturnal tricks at the entrance of the cavern, to conjure the chief of the evil spirits.

At the point where the river formed the subterranean cascade, a hill covered with vegetation, which was opposite to the opening of the grotto, presented a very picturesque aspect. It was seen at the extremity of a straight passage, one thousand four hundred and fifty feet in length. The stalactites descending from the roof, and resembling columns suspended in the air, were relieved on a background of verdure. The opening of the cavern appeared singularly contracted, when the travellers saw it about the middle of the day, illumined by the vivid light reflected at once from the sky, the plants, and the rocks. The distant light of day formed a strange contrast with the darkness which surrounded them in the vast cavern. They discharged their guns at a venture, wherever the cries of the nocturnal birds and the flapping of their wings led them to suspect that a great number of nests were crowded together. After several fruitless attempts Bonpland succeeded in killing a couple of guacharos, which, dazzled by the light of the torches,

seemed to pursue him. This circumstance afforded Humboldt the means of making a drawing of this bird, which had previously been unknown to naturalists.

In this part of the cavern, the rivulet deposited a blackish mould. They could not discover whether it fell through the cracks which communicated with the surface of the ground above, or was washed down by the rain-water penetrating into the cavern. They walked in thick mud to a spot where they beheld with astonishment the progress of subterranean vegetation. The seeds which the birds had carried into the grotto to feed their young, had sprung up wherever they could fix in the mould which covered the incrustations. Blanched stalks, with some half-formed leaves, had risen to the height of two feet. It was impossible to ascertain the species of these plants, their form, colour, and aspect having been changed by the absence of light. These traces of organization amidst darkness forcibly excited the curiosity of the natives, who examined them with silent meditation inspired by a place they seemed to dread. They regarded these subterranean plants, pale and deformed, as phantoms banished from the face of the earth. To Humboldt the scene recalled one of the happiest periods of his youth—his abode in the mines of Freyberg, where he had made experiments on the effects of blanching.

The missionaries, with all their authority, could not prevail on the Indians to penetrate farther into the cavern. As the roof became lower the cries of the guacharos were more and more shrill. The travellers were obliged to yield to the pusillanimity of their guides, and retrace their steps.

On turning back to go out of the cavern, they followed the course of the torrent. Before their eyes became dazzled with the light of day they saw on the outside of the grotto the water of the river sparkling amid the foliage of the trees which shaded it. It was like a picture placed in the distance, the mouth of the cavern serving as a frame. Having at length reached the entrance, they seated themselves on the bank of the rivulet, to rest after their fatigues. They were glad to be beyond the hoarse cries of the birds, and to leave a place where darkness did not offer even the charm of silence and tranquillity.

Swiftly glided their days in the convent of Caripe. From sunrise to nightfall they traversed the forests and neighbouring mountains, to collect plants. When the winter rains prevented them from undertaking distant excursions, they visited the huts of the Indians, the garden of the community, or assemblies in which the alcaldes every evening arranged the labours of the succeeding day. They returned to the monastery only when the sound of the bell called them to the refectory to share the repasts of the missionaries. Sometimes, very early in the morning, they followed them to the church, to attend the religious instruction of the Indians. After passing almost the whole day in the open air, they employed their evenings, at the convent, in making notes, drying their plants, and sketching those that appeared to form new genera. Unfortunately the misty atmosphere of a valley, where the surrounding forests filled the air with an enormous quantity of vapour, was unfavourable to astronomical observations. Humboldt spent a part of the nights waiting to take advantage of

the moment when some star should be visible between the clouds, near its passage over the meridian. He often shivered with cold, though the thermometer only sank to 60°. The instruments remained set up in the court of the convent for several hours, yet he was almost always disappointed in his expectations.

From the valley of Caripe the travellers proceeded across a ridge of hills, and over a vast savannah, to the table-land of Guardia de San Augustin. Beyond this was a slope, extremely slippery and steep, to which the missionaries had given the name of the Descent of Purgatory. When they looked down from the top to the bottom of the hill the road seemed inclined more than 60°. The mules in going down drew their hind legs near to their fore legs, and lowering their cruppers, let themselves slide at a venture. They soon entered a thick forest, known by the name of the Montaña de Santa Maria. Here they descended without intermission for seven hours. It was difficult to conceive a more tremendous descent; it was absolutely a road of steps, a kind of ravine, in which, during the rainy season, impetuous torrents dashed from rock to rock. The steps were from two to three feet high, and the beasts of burden, after measuring with their eyes the space necessary to let their load pass between the trunks of the trees, leaped from one rock to another. Afraid of missing their mark, the travellers saw them stop a few minutes to scan the ground, and bring together their four feet like wild goats. If the animal did not reach the nearest block of stone, he sank half his depth into the soft ochreous clay, that filled up the interstices of the rock. When the blocks were wanting, enormous roots served

as supports for the feet of men and beasts. Some of these roots were twenty inches thick, and they often branched out from the trunks of the trees much above the level of the soil. The Creoles had sufficient confidence in the address and instinct of the mules, to remain in their saddles during this long and dangerous descent. Fearing fatigue less than they did, and being accustomed to travel slowly for the purpose of gathering plants and examining the nature of the rocks, Humboldt and Bonpland preferred going down on foot.

The weather was cloudy. The sun at times illumined the tops of the trees, and, though sheltered from its rays, they felt an oppressive heat. Thunder rolled at a distance; the clouds seemed suspended on the tops of the lofty mountains of the Guacharo; and the plaintive howling of the monkeys denoted the proximity of a storm. They stopped to observe these monkeys, which, to the number of thirty or forty, crossed the road, passing in a file from one tree to another over the horizontal and intersecting branches. While the travellers were observing their movements they saw a troop of Indians going towards the mountains of Caripe. They were without clothing, as the natives of this country generally are. The women, laden with rather heavy burdens, closed the march. The men were all armed, and even the youngest boys had bows and arrows. They moved on in silence, with their eyes fixed on the ground. The travellers endeavoured to learn from them whether they were yet far from the Mission of Santa Cruz, where they intended passing the night. They were overcome with fatigue, and suffered from thirst. The heat increased as the storm drew near, and they had not met with a single

spring on their way. The words *si, patre, no, patre,* which the Indians continually repeated, led them to think they understood a little Spanish. In the eyes of a native every white man was a monk; for in the Missions the colour of the skin characterized the monk, more than the colour of the garment. In vain they questioned the Indians respecting the length of the way: they answered, *si* and *no*, without the travellers being able to attach any precise sense to their replies. This made them the more impatient, as their smiles and gestures indicated their wish to direct them; and the forest seemed at every step to become thicker and thicker. At length they separated from the Indians; their guides were able to follow them only at a distance, because the beasts of burden fell at every step in the ravines.

After journeying for several hours, continually descending on blocks of scattered rock, they found themselves unexpectedly at the outlet of the forest of Santa Maria. A savannah stretched before them farther than the eye could reach. On the left was a narrow valley, extending as far as the mountains of the Guacharo, and covered with a thick forest. Looking downward the eyes of the travellers rested on the tops of the trees, which, at eight hundred feet below the road, formed a carpet of verdure of dark and uniform tint. They passed the night at one of the king's houses already mentioned.

They were desirous of continuing their journey eastward still farther, but learning that the roads were impassable in consequence of the torrents of rain that had fallen, and that they would be likely to lose the plants which they had already gathered, they resolved to embark at Cariaco, and return to Cumana by the gulf,

instead of passing between the island of Margareta and the isthmus of Araya. They accordingly started from the mission of Catuaro, and proceeded to the town of Cariaco, where they embarked in a canoe, on the morning of the 24th. Quitting the town they sailed westward along the river of Carenicuar, which ran through gardens and plantations of cotton trees. They saw the Indian women on the banks washing their clothes with the fruit of the soap-berry. Contrary winds beset them in the gulf of Cariaco. The rain fell in torrents, and the thunder rolled very near. Swarms of flamingoes, egrets, and cormorants filled the air, seeking the shore, whilst the alcatras alone continued peaceably to fish in the middle of the gulf. They landed till evening, and then resumed their voyage, under a misty sky. In the morning they saw the vultures perching on the cocoa-trees, in flocks of forty or fifty.

At last they reached Cumana.

CHAPTER III.

TOWARDS THE ORINOCO.

HUMBOLDT and Bonpland remained a month at Cumana, employing themselves in preparing for a visit tc the Orinoco and the Rio Negro. They had to choose such instruments as could be most easily transported in narrow boats; and to engage guides for an inland journey of ten months, across a country without communication with the coasts. The astronomical determination of places being the most important object of this undertaking, Humboldt felt desirous not to miss the observation of an eclipse of the sun, which was to be visible at the end of October: and in consequence preferred remaining till that period at Cumana, where the sky was generally clear and serene. It was now too late to reach the banks of the Orinoco before October; and the high valleys of Caracas promised less favourable opportunities on account of the vapours which accumulated round the neighbouring mountains.

He was, however, near being compelled by a deplorable occurrence, to renounce, or at least delay for a long time, his journey to the Orinoco. On the 27th of October, the day before the eclipse, he and Bonpland went as usual to take the air on the shore of the gulf, and to observe the instant of high water, which in those parts

was only twelve or thirteen inches. It was eight in the evening, and the breeze was not yet stirring. They crossed the beach which separated the suburb of the Guayqueria Indians from the landing-place. Here Humboldt heard some one walking behind them, and on turning he saw a tall Zambo, naked to the waist. He held almost over Humboldt's head a stick of palm-tree wood, enlarged to the end like a club. Humboldt avoided the stroke by leaping towards the left; but Bonpland, who walked on his right, was less fortunate. He did not see the Zambo as soon as Humboldt did, and received a stroke above the temple, which levelled him to the ground. The travellers were alone, without arms, half a league from any habitation, on a vast plain bounded by the sea. The Zambo, instead of attacking Humboldt, moved off slowly to pick up Bonpland's hat, which, having somewhat deadened the violence of the blow, had fallen off and lay at some distance. Alarmed at seeing his companion on the ground, and for some moments senseless, Humboldt thought of him only. He helped Bonpland to raise himself, and pain and anger doubled his strength. They ran towards the Zambo, who, either from cowardice, or because he perceived at a distance some men on the beach, did not wait for them, but ran off in the direction of a little thicket of cactus. He chanced to fall in running, and Bonpland, who reached him first, seized him round the body. The Zambo drew a long knife; and in this unequal struggle the travellers would infallibly have been wounded, if some Biscayan merchants, who were taking the air on the beach, had not come to their assistance. The Zambo seeing himself surrounded, thought no longer of defence. He again

ran away, and they pursued him through the thorny cactuses. At length, tired out, he took shelter in a cow-house, whence he suffered himself to be quietly led to prison.

Bonpland was seized with fever during the night; but being endowed with great energy and fortitude he continued his labours the next day. The stroke of the club had extended to the top of his head, and he felt its effect for the space of two or three months. When stooping to collect plants, he was sometimes seized with giddiness, which led him to fear that an internal abscess was forming. Happily these apprehensions were unfounded, and the symptoms gradually disappeared.

During a few days which preceded and followed the eclipse of the sun, very remarkable atmospherical phenomena were observable. From the 10th of October to the 3rd of November, at nightfall, a reddish vapour arose in the horizon, and covered, in a few minutes, with a veil more or less thick, the azure vault of the sky. Sometimes, in the midst of the night, the vapours disappeared in an instant; and at the moment when Humboldt had arranged his instruments, clouds of brilliant whiteness collected at the zenith, and extended towards the horizon. On the 18th of October these clouds were so remarkably transparent, that they did not hide stars even of the fourth magnitude. He could distinguish so perfectly the spots of the moon, that it might have been supposed its disk was before the clouds.

After the 28th of October, the reddish mist became thicker than it had previously been. The heat of the nights seemed stifling, though the thermometer rose only to 78°. The breeze, which generally refreshed the air from eight or nine o'clock in the evening, was no longer

felt. The atmosphere was burning hot, and the parched and dusty ground was cracked on every side. On the 4th of November, about two in the afternoon, large clouds of peculiar blackness enveloped the high mountains of the Brigantine and the Tataraqual. They extended by degrees as far as the zenith. About four in the afternoon Humboldt and Bonpland heard thunder over their heads, at an immense height, not regularly rolling, but with a hollow and often interrupted sound. At the moment of the strongest electric explosion, at twelve minutes past four, there were two shocks of earthquake, which followed each other at the interval of fifteen seconds. The people ran into the streets, uttering loud cries. Bonpland, who was leaning over a table, examining plants, was almost thrown on the floor. Humboldt felt the shock very strongly, though he was lying in a hammock. Some slaves, who were drawing water from a well eighteen or twenty feet deep, near the river Manzanares, heard a noise like the explosion of a strong charge of gunpowder. The noise seemed to come from the bottom of the well.

A few minutes before the first shock there was a very violent blast of wind, followed by electrical rain, falling in great drops. The sky remained cloudy, and the blast of wind was followed by a dead calm, which lasted all night. The sunset presented a picture of extraordinary magnificence. The thick veil of clouds was rent asunder, as in shreds, quite near the horizon; the sun appeared at 12° of altitude on a sky of indigo-blue. Its disk was enormously enlarged, distorted, and undulated towards the edges. The clouds were gilded; and fascicles of divergent rays, reflecting

the most brilliant rainbow hues, extended over the heavens. A great crowd of people assembled in the public square. This celestial phenomenon, the earthquake, the thunder which accompanied it, the red vapour seen during so many days, all were regarded as the effect of the eclipse. About nine in the evening there was another shock, much slighter than the former, but attended with a subterraneous noise. In the night between the 3d and 4th of November the reddish vapour was so thick that Humboldt could not distinguish the situation of the moon, except by a beautiful halo of 20° diameter.

The travellers had frequent visits from persons who wished to know whether their instruments indicated new shocks for the next day; and alarm was great and general when, on the 5th, exactly at the same hour as on the preceding day, there was a violent gust of wind, attended by thunder, and a few drops of rain. No shock was felt. The wind and storm returned during five or six days at the same hour, almost at the same minute.

The reddish vapour disappeared after the 7th of November. The atmosphere resumed its former purity, and the firmament appeared, at the zenith, of that deep blue tint peculiar to climates where heat, light, and a great equality of electric charge seem all to promote the most perfect dissolution of water in the air. Humboldt observed, on the night of the 7th, the immersion of the second satellite of Jupiter. The belts of the planet were more distinct than he had ever seen them before.

The night of the 11th was cool, and extremely fine. From half after two in the morning, the most extraordinary luminous meteors were seen in the direction of the east. Bonpland, who had risen to enjoy the freshness of

the air, perceived them first. Thousands of bolides and falling stars succeeded each other during the space of four hours. No trace of clouds was to be seen. From the first appearance of the phenomenon, there was not in the firmament a space equal in extent to three diameters of the moon, which was not filled every instant with bolides and falling stars. The first were fewer in number, but as they were of different sizes, it was impossible to fix the limit between these two classes of phenomena. All these meteors left luminous traces from 5° to 10° in length. The phosphorescence of these traces, or luminous bands, lasted seven or eight seconds.

The phenomenon ceased by degrees after four o'clock, and the bolides and falling stars became less frequent, though Humboldt still distinguished some to the north-east by their whitish light, and the rapidity of their movement, a quarter of an hour after sunrise.

On the evening of the 16th of November the travellers set sail from Cumana for La Guayra, descending the little river of Manzanares, the windings of which were marked by cocoanut-trees. At high water they passed the bar at its mouth. The evening breeze gently swelled the waves in the gulf of Cariaco. The moon had not risen, but that part of the milky way which extended from the feet of the Centaur towards the constellation of Sagittarius, seemed to pour a silvery light over the surface of the ocean. The white rock, crowned by the castle of San Antonio, appeared from time to time between the high tops of the cocoa-trees which bordered the shore, and the voyagers soon recognised the coasts only by the scattered lights of the Guayqueria fishermen.

As they advanced towards the shoal that surrounded

Cape Arenas they enjoyed one of those varied sights which the great phosphorescence of the sea so often displays in those climates. Bands of porpoises followed their bark. Fifteen or sixteen of these animals swam at equal distances from each other. When turning on their backs, they struck the surface of the water with their broad tails; they diffused a brilliant light, which seemed like flames issuing from the depth of the ocean. Each band of porpoises, ploughing the surface of the waters, left behind it a track of light, the more striking as the rest of the sea was not phosphorescent.

The voyagers found themselves at midnight between some barren and rocky islands, which uprose like bastions in the middle of the sea, and formed the group of the Caracas and Chimanas. The moon was above the horizon, and lighted up these cleft rocks, which were bare of vegetation and of fantastic aspect.

As they came near this group of mountainous islands, they were becalmed; and at sunrise, small currents drifted them towards Boracha, the largest of them. The temperature of the atmosphere became sensibly higher whilst they were sailing among the islands of this little archipelago. The rocks, heated during the day, threw out at night, by radiation, a part of the heat absorbed. As the sun rose on the horizon, the rugged mountains projected their vast shadows on the surface of the ocean. The flamingoes began to fish in the creeks. Humboldt and Bonpland saw them as they passed, standing like a file of soldiers, along the narrow beaches, and necks of land.

They were so far advanced on their voyage on the morning of the 20th, that they hoped to reach La Guayra

that day; but their Indian pilot being afraid of the privateers who were near that port, thought it would be prudent to make for land, and anchor in the little harbour of Higuerote, which they had already passed, and await the shelter of night to proceed on their voyage. They found neither village nor farm there, but merely two or three huts, inhabited by fishermen. Their livid hue, and the meagre condition of their children, showed the voyagers that this spot was one of the most unhealthy of the whole coast. The sea had so little depth along these shores, that even with the smallest barks it was impossible to reach the shore without wading through the water. The forests came down nearly to the beach, which was covered with thickets of mangroves, avicennias, and manchineel-trees. To these thickets, and particularly to the exhalations of the mangroves, Humboldt attributed the extreme insalubrity of the air. On quitting the boats, and whilst they were yet one hundred feet distant from the land, he perceived a faint and sickly smell, which reminded him of that diffused through the galleries of deserted mines. The temperature of the air rose to 93°, heated by the reverberation from the white sands which formed a line between the mangroves and the great trees of the forest. As the shore descended with a gentle slope, small tides were sufficient alternately to cover and uncover the roots, and part of the trunks of the mangroves. The sea-water, along the whole coast, acquired a yellowish brown tint, wherever it came into contact with the mangrove trees. The beaches around were covered with infinite numbers of molluscs and insects. Loving shade and faint light they sheltered themselves from the shock of the waves

amid the scaffolding of thick and intertwining roots, which rose like lattice-work above the surface of the waters. Shell-fish clung to this lattice; crabs nestled in the hollow trunks; and the seaweeds, drifted to the coast by the winds and tides, remained suspended on the branches which inclined towards the earth.

They set sail from this noxious place at nightfall. At sunrise they were opposite Caracas. The coast was rocky and elevated, the scenery at once wild and picturesque. They were sufficiently near land to distinguish scattered huts surrounded by cocoa-trees, and masses of vegetation, which stood out from the dark ground of the rocks. The mountains were everywhere perpendicular, and three or four thousand feet high; their sides cast broad and deep shadows upon the humid land, which stretched out to the sea, glowing with the freshest verdure. They soon saw the black rocks of La Guayra, studded with batteries rising in tiers one over another; and in the misty distance, Cabo Blanco, a long promontory with conical summits, and of dazzling whiteness.

Humboldt and Bonpland remained two months at Caracas, in a large house in the most elevated part of the town. From a gallery they could survey at once the summit of the Saddle, the serrated ridge of the Galipano, and the charming valley of the Guayra, the rich culture of which was pleasingly contrasted with the gloomy curtain of the surrounding mountains. It was in the dry season, and to improve the pasturage, the savannahs and the turf covering the steepest rocks were set on fire. These vast conflagrations, viewed from a distance, produced the most singular effects of light. Wherever the savannahs, following the undulating slope of the rocks,

had filled up the furrows hollowed out by the waters, the flame appeared in a dark night like currents of lava suspended over the valley. The vivid but steady light assumed a reddish tint, when the wind, descending from the Saddle, accumulated streams of vapour in the low regions. At other times these luminous bands, enveloped in thick clouds, appeared only at intervals where it was clear; and as the clouds ascended their edges reflected a splendid light. These various phenomena, so common in the tropics, acquired additional interest from the form of the mountains, the direction of the slopes, and the height of the savannahs covered with alpine grasses. During the day, the wind of Petare, blowing from the east, drove the smoke towards the town, and diminished the transparency of the air.

On the morning of the 3d of January they commenced the ascent of the Saddle, a celebrated mountain near Caracas. The party consisted of eighteen persons, and they all walked one behind another, in a narrow path, traced on a steep acclivity, covered with turf. They reached a hill, connected with the body of the mountain, and called the Gate of the Saddle. Here they crossed a narrow dyke of rocks, which led to the ridge of the mountain, and looked down on two valleys, filled with thick vegetation. In one of these valleys they heard the roaring of waterfalls, which they could not see, they were so thickly hidden in groves of fig-trees.

From the Gate of the Saddle the steepness of the ascent increased, and they were obliged to incline their bodies considerably forwards as they advanced. They felt the want of cramp-irons, or sticks shod with iron. Short grass covered the rocks of gneiss, and it was

equally impossible to hold by the grass, or to form steps as they might have done in softer ground. This ascent, which was attended with more fatigue than danger, discouraged those who accompanied them from the town, and who were unaccustomed to climb mountains. The travellers lost much time in waiting for them, and they did not resolve to proceed alone till they saw them descending the mountain instead of climbing it. The weather was becoming cloudy; the mist already issued in the form of smoke, and in slender and perpendicular streaks, from a small humid wood which bordered the region of alpine savannahs above them. It seemed as if a fire had burst forth at once on several points of the forest. These streaks of vapour gradually accumulated together, and rising above the ground, were carried along by the morning breeze, and glided like a light cloud over the rounded summit of the mountain.

Humboldt and Bonpland foresaw from these signs, that they would soon be covered by a thick fog; and lest their guides should take advantage of this circumstance and leave them, they obliged those who carried the most necessary instruments to precede them. The familiar loquacity of the Creole blacks formed a striking contrast with the taciturn gravity of the Indians, who had constantly accompanied them in the missions of Caripe. The negroes amused themselves by laughing at the persons who had been in such haste to abandon an expedition so long in preparation; above all, they did not spare a young Capuchin monk, a professor of mathematics, who never ceased to boast of the superior physical strength and courage possessed by all classes of European Spaniards over those born in Spanish America.

He had provided himself with long slips of white paper, which were to be cut, and flung on the savannah, to indicate to those who might stray behind, the direction they ought to follow. The professor had even promised the friars of his order to fire off some rockets, to announce to the whole town of Caracas that they had succeeded in an enterprise which to him appeared of the utmost importance. He had forgotten that his long and heavy garments would embarrass him in the ascent. Having lost courage long before the Creoles, he passed the rest of the day in a neighbouring plantation, gazing at the travellers through a glass directed to the Saddle, as they climbed the mountain. Unfortunately for them, however, he had taken charge of the water and the provision so necessary in an excursion to the mountains. The slaves who were to rejoin them were so long detained by him, that they arrived very late, and the travellers were ten hours without either bread or water.

They were sometimes so enveloped with mist that they could not without difficulty find their way. At this height there was no path, and they were obliged to climb with their hands, when their feet failed them, on the steep and slippery ascent. After proceeding for the space of four hours across the savannahs, they entered into a little wood composed of shrubs and small trees. The steepness of the mountain became less considerable, and they felt an indescribable pleasure in examining the plants of this region. Quitting the wood they found themselves again in a savannah. They climbed over a part of the western dome, in order to descend into the hollow of the Saddle, a valley which separated the two summits of the mountain. They had great difficulties

to overcome here, occasioned by the force of the vegetation, and were obliged to cut their way through this forest: the negroes walked before them with cutlasses, chopping down the limbs that opposed them.

On a sudden they found themselves enveloped in a thick mist; the compass alone could guide them. In advancing northward they were in danger at every step of finding themselves on the brink of an enormous wall of rocks, which descended almost perpendicularly to the depth of six thousand feet towards the sea. They were obliged to halt. Surrounded by clouds sweeping the ground, they began to doubt whether they should reach the eastern peak before night. Happily, the negroes who carried their water and provisions, rejoined them, and they resolved to take some refreshment. Their repast did not last long. As it was only two o'clock in the afternoon, they entertained some hope of reaching the eastern summit of the Saddle before sunset, and of re-descending into the valley separating the two peaks, intending there to pass the night, to light a great fire, and to make their negroes construct a hut. They sent off half of their servants with orders to hasten the next morning to meet them with a supply of salt beef. They had scarcely made these arrangements when the east wind began to blow violently from the sea. In less than two minutes the clouds dispersed, and the two domes of the Saddle appeared singularly near.

They shaped their course to the eastern summit, which they were three-quarters of an hour in reaching. They were now over eight thousand feet high, and they gazed on an extent of sea, the radius of which was thirty-six leagues. It was as smooth as glass, but in the distance

it was lost in the strata of air. They expected, as at Teneriffe, to see the horizon level with the eye, but in stead of distinguishing a marked limit between the twc elements, the distant strata of water seemed to be transformed into vapour, and mingled with the aerial ocean. The western dome of the Saddle concealed from them the view of the town of Caracas; but they distinguished the nearest houses, the villages of Chacao and Petare, the coffee plantations, and the course of the Rio Guayra, a slender streak of water reflecting a silvery light.

While they were examining with their glasses that part of the sea, the horizon of which was clearly defined, and the chain of the mountains of Ocumare, behind which began the unknown world of the Orinoco and the Amazon, a thick fog from the plains rose to the elevated regions, first filling the bottom of the valley of Caracas. The vapours, illumined from above, presented a uniform tint of a milky white. The valley seemed overspread with water, and looked like an arm of the sea, of which the adjacent mountains formed the steep shore.

Seated on the rock, Humboldt was determining the dip of the needle, when he found his hands covered with a species of hairy bee, a little smaller than the honey-bee of the north of Europe. These insects make their nests in the ground. The people, in these regions, call them little angels, because they seldom sting.

The fog became so dense that it would have been imprudent to remain any longer, so they descended. It was now half-past four in the afternoon. Satisfied with the success of their journey, they forgot that there might be danger in descending in the dark, steep declivities

covered by a smooth and slippery turf. The mist concealed the valley from them; but they distinguished the double hill of The Gate, which, like all objects lying almost perpendicularly beneath the eye, appeared extremely near. They relinquished their design of passing the night between the two summits of the Saddle, and having again found the path that they cut through the thick wood, they soon arrived at the little wood already mentioned. As there is scarcely any twilight in the tropics, they passed suddenly from bright daylight to darkness. The moon was on the horizon; but her disk was veiled from time to time by thick clouds, drifted by a cold and rough wind. Rapid slopes, covered with yellow and dry grass, now seen in shade, and now suddenly illumined, seemed like precipices, the depth of which the eye sought in vain to measure. They proceeded onwards in single file, and endeavoured to support themselves by their hands, lest they should roll down. The guides, who carried their instruments, abandoned them successively, to sleep on the mountain. Among those who remained with them was a Congo black, who evinced great address, bearing on his head a large dipping-needle: he held it constantly steady, notwithstanding the extreme declivity of the rocks. The fog had dispersed by degrees in the bottom of the valley, and the scattered lights they perceived below them caused a double illusion. The steeps appeared more dangerous than they really were; and, during six hours of continual descent, they seemed to be always equally near the farms at the foot of the Saddle. They heard very distinctly the voices of men and the notes of guitars. Sound is generally so well propagated upwards, that in a balloon

at the elevation of eighteen thousand feet, the barking of dogs is sometimes heard.

They did not arrive till ten at night at the bottom of the valley. They were overcome with fatigue and thirst, having walked for fifteen hours, nearly without stopping. The soles of their feet were cut and torn by the asperities of a rocky soil and the hard and dry stalks, for they had been obliged to pull off their boots, the soles having become too slippery.

They passed the night at the foot of the Saddle.

On the 7th of February they departed from Caracas, *en route* for the banks of the Orinoco. Nothing worthy of note occurred for several days.

Not far from the village of Turmero, they discovered at a league distant, an object, which appeared at the horizon like a round hillock, or tumulus, covered with vegetation. It was neither a hill, nor a group of trees close to each other, but one single tree, the famous Zamang del Guayre, known throughout the province for the enormous extent of its branches, which formed a hemispheric head five hundred and seventy-six feet in circumference. The zamang is a fine species of mimosa, and its tortuous branches are divided by bifurcation. Its delicate and tender foliage was agreeably relieved on the azure of the sky. They stopped a long time under this vegetable roof. The trunk of the Zamang del Guayre was only sixty feet high, and nine thick; its real beauty consisted in the form of its head. The branches extended like an immense umbrella, and bent toward the ground, from which they remained at a uniform distance of twelve or fifteen feet. The circumference of this head was so regular, that, having traced different diame-

ters, Humboldt found them one hundred and ninety-two, and one hundred and eighty-six feet. One side of the tree was entirely stripped of its foliage, owing to the drought; but on the other side there remained both leaves and flowers; parasites covered its branches, and cracked the bark. The inhabitants of the adjacent villages, particularly the Indians, held in great veneration the Zamang del Guayre, which the first conquerors found almost in the same state in which it now remains. Humboldt considered it at least as old as the Orotava dragon-tree.

On the 21st, in the evening, the travellers set out for Guacara and Nueva Valencia. They preferred travelling by night, on account of the excessive heat of the day. The road was bordered with large zamang-trees, the trunks of which rose sixty feet high. Their branches, nearly horizontal, met at more than one hundred and fifty feet distance. The night was gloomy: the Rincon del Diablo with its denticulated rocks appeared from time to time at a distance, illumined by the burning of the savannahs, or wrapped in ruddy smoke. At the spot where the bushes were thickest, their horses were frightened by the yell of an animal that seemed to follow them closely. It was a large jaguar, which had roamed for three years among these mountains. He had constantly escaped the pursuits of the boldest hunters, and had carried off horses and mules from the midst of inclosures; but, having no want of food, had not yet attacked men. The negro who conducted the travellers uttered wild cries, expecting by these means to frighten the jaguar, but his efforts were ineffectual.

On the morning of the 27th they visited the hot springs

of La Trinchera. Next to the springs of Urijino, in Japan, the waters of La Trinchera are the hottest in the world. Humboldt and Bonpland breakfasted near them, and found that eggs plunged into the water boiled in less than four minutes. The heat became stifling as they approached the coast. A reddish vapour filled the horizon. It was near sunset, and the breeze was not yet stirring. The river of hot water, along the banks of which they passed, became deeper. A crocodile, more than nine feet long, lay dead on the strand. Humboldt wished to examine its teeth, and the inside of its mouth; but having been exposed to the sun for several weeks, it exhaled a smell so fetid that he was obliged to relinquish his design and remount his horse.

Between Porto Cabello and the valleys of Aragua they saw a remarkable tree. They had heard, several weeks before, of a tree, the sap of which was a nourishing milk. It was called 'the cow-tree'; and they were assured that the negroes, who drank plentifully of this vegetable milk, considered it a wholesome aliment. All the milky juices of plants being acrid, bitter, and more or less poisonous, this account appeared to them very extraordinary; but they found by experience during their stay in the neighbourhood, that the virtues of this tree had not been exaggerated. It rose like the broad-leaved star-apple. Its oblong and pointed leaves, rough and alternate, were marked by lateral ribs, prominent at the lower surface and parallel. Some of them were ten inches long. They did not see the flower: the fruit was somewhat fleshy, and contained one and sometimes two nuts. When incisions were made in the trunk it yielded an abundance of glutinous milk, tolerably thick, devoid

of all acridity, and of an agreeable and balmy smell. The travellers drank considerable quantities of it in the evening before they went to bed, and very early in the morning, without feeling the least injurious effect. The negroes and the free people who worked in the plantations drank it, dipping into it their bread of maize or cassava. The overseer of the farm told Humboldt that the negroes grew sensibly fatter during the season when it furnished them with most milk. It was at the rising of the sun that this vegetable fountain was most abundant. The negroes and natives were then seen hastening from all quarters, furnished with large bowls to receive the milk, which grew yellow, and thickened at its surface. Some emptied their bowls under the tree itself, others carried the juice home to their children.

They left the valleys of Aragua at sunrise on the 6th of March. They were never weary of admiring the fertility of the soil, covered with calabashes, watermelons, and plantains. The rising of the sun was announced by the distant noise of the howling monkeys. Approaching a group of trees, they saw numerous bands of these monkeys moving as in procession and very slowly, from one tree to another. A male was followed by a great number of females, several of the latter carrying their young on their shoulders. The howling monkeys, which live in society in different parts of America, everywhere resemble each other in their manners, though the species are not always the same. The uniformity with which they perform their movements is extremely striking. Whenever the branches of neighbouring trees do not touch each other, the male who leads the party suspends himself by the callous and prehensile part of

his tail; and, letting fall the rest of his body, swings himself till in one of his oscillations he reaches the neighbouring branch. The whole file performs the same movements on the same spot. The Indians told the travellers that when the monkeys filled the forests with their howling, there was always one that chaunted as leader of the chorus. During a long interval one solitary and strong voice was generally distinguished, till its place was taken by another voice of a different pitch. The Missionaries asserted that when a female among them was on the point of bringing forth, the choir suspended its howlings till the moment of the birth of the young.

At Guigue they lodged with an old sergeant, a native of Murcia, a man of a very original character. To prove to them that he had studied among the Jesuits, he recited the history of the creation of the world in Latin. He knew the names of Augustus, Tiberius, and Diocletian; and while enjoying the agreeable coolness of the nights in an inclosure planted with bananas, he employed himself in reading all that related to the courts of the Roman emperors. He inquired of Humboldt for a remedy for the gout, from which he suffered severely. "I know," said he, "a Zambo of Valencia, a famous *curioso*, who could cure me; but the Zambo would expect to be treated with attentions which I cannot pay to a man of his colour, so I prefer remaining as I am."

In the Mesa de Paja, in the ninth degree of latitude, they entered the basin of the Llanos. The sun was almost at its zenith; the earth, wherever it appeared sterile and destitute of vegetation, was at the temperature of 118° or 122°. Not a breath of air was felt at the height

at which they were on their mules; yet, in the midst of this apparent calm, whirls of dust incessantly arose, driven on by small currents of air which glided over the surface of the ground, and were occasioned by the difference of temperature between the naked sand and the spots covered with grass. These sand-winds augmented the suffocating heat of the air. Every grain of quartz, hotter than the surrounding air, radiated heat in all directions; and it was difficult for Humboldt to observe the temperature of the atmosphere, owing to the particles of sand striking against the bulb of the thermometer. All around the plains seemed to ascend to the sky, and the vast and profound solitude appeared like an ocean covered with sea-weed. The horizon in some parts was clear and distinct, in other parts it appeared undulating, sinuous, and as if striped. The earth there was confounded with the sky. Through the dry mist and strata of vapour the trunks of palm-trees were seen from afar, stripped of their foliage and their verdant summits, and looking like the masts of a ship descried upon the horizon. There was something awful, as well as sad and gloomy, in the uniform aspect of these steppes. Every thing seemed motionless; scarcely did a small cloud, passing across the zenith, and denoting the approach of the rainy season, cast its shadow on the earth.

The chief characteristic of these steppes was the absolute want of hills and inequalities—the perfect level of every part of the soil. Often within a distance of thirty square leagues there was not an eminence of a foot high.

After having passed two nights on horseback, and sought in vain, by day, for some shelter from the heat of the sun beneath the tufts of the palm-trees, they

arrived at a little farm. It was a solitary house in the steppes, surrounded by a few small huts, covered with reeds and skins. The cattle, oxen, horses, and mules were not penned, but wandered freely over an extent of several square leagues. There was nowhere any inclosure; men, naked to the waist and armed with lances, rode over the savannahs to inspect the animals, bringing back those that wandered too far from the pastures of the farm, and branding all that did not already bear the mark of their proprietor. These mulattoes were partly freed-men and partly slaves. They were constantly exposed to the burning heat of the tropical sun. Their food was meat dried in the air, and a little salted; and of this even their horses sometimes partook. Being always in the saddle, they fancied they could not make the slightest excursion on foot. The travellers found an old negro slave, who managed the farm in the absence of his master. He told them of herds composed of several thousand cows, that were grazing in the steppes; yet they asked in vain for a bowl of milk. They were offered, in a calabash, some yellow, muddy, and fetid water, drawn from a neighbouring pool. The indolence of the inhabitants of the Llanos was such that they did not dig wells, though they knew that almost everywhere, at ten feet deep, fine springs were found. After suffering during one half of the year from the effect of inundations, they quietly resigned themselves, during the other half, to the most distressing deprivation of water. The old negro advised the travellers to cover the cup with a linen cloth, and drink as through a filter, that they might not be incommoded by the smell, and might swallow less of the yellowish mud suspended in the water.

As soon as their instruments were unloaded they let the mules go to search for water, a common custom in the Llanos. They followed them till they came to one of the pools from which the water they had drunk was drawn. They longed impatiently to take a bath, but found only a great pool of feculent water, surrounded with palm-trees. The water was turbid, though a little cooler than the air. Accustomed during their long journey to bathe whenever they had an opportunity, often several times in a day, they hastened to plunge into the pool. They had scarcely begun to enjoy the coolness of the bath, when a noise which they heard on the opposite bank, made them leave the water precipitately. It was an alligator plunging into the mud.

They were only at the distance of a quarter of a league from the farm, yet they continued walking more than an hour without reaching it. They perceived too late that they had taken a wrong direction. Having left it at the decline of day, before the stars were visible, they had gone forward into the plain at hazard. They were provided with a compass, and it might have been easy for them to steer their course from the position of Canopus and the Southern Cross; but unfortunately they were uncertain whether, on leaving the farm, they had gone towards the east or the south. They attempted to return to the spot where they had bathed, and again walked three quarters of an hour without finding the pool. They sometimes thought they saw fire on the horizon; but it was the light of the rising stars enlarged by the vapours. After having wandered a long time in the savannah, they resolved to seat themselves beneath the trunk of a palm-tree, in a spot perfectly dry, sur-

rounded by short grass. They could not flatter themselves that their guides would come in search of them in the savannah before they had prepared their food and finished their repast. Whilst somewhat perplexed by the uncertainty of their situation, they were agreeably affected by hearing from afar the sound of a horse advancing towards them. The rider was an Indian, armed with a lance, who had just made the round, in order to collect the cattle. The sight of two white men, who said they had lost their way, led him at first to suspect some trick. They found it difficult to inspire him with confidence; he at last consented to guide them to the farm, but without slackening the gentle trot of his horse. Their guides assured them that they had already begun to be uneasy about them; and, to justify this inquietude, they gave a long enumeration of persons who, having lost themselves in the Llanos, had been found nearly exhausted.

In order to escape as much as possible from the heat of the day, they set off at two in the morning, with the hope of reaching before noon Calabozo, a small but busy trading-town, situated in the midst of the Llanos. The aspect of the country was still the same. There was no moonlight; but the great masses of nebulæ that spotted the southern sky enlightened, as they set, a part of the terrestrial horizon. The solemn spectacle of the starry vault, seen in its immense expanse;—the cool breeze which blew over the plain during the night:—the waving motion of the grass, wherever it had attained any height; everything recalled to their minds the surface of the ocean. The illusion was deepened when the disk of the sun appearing on the horizon, repeated its image by

the effects of refraction, and, soon losing its flattened form, ascended rapidly and straight towards the zenith.

In proportion as the sun rose towards the zenith, and the earth and the strata of superincumbent air took different temperatures, the phenomenon of the mirage displayed itself in its numerous modifications. The little currents of air that swept the surface of the soil had so variable a temperature that, in a drove of wild oxen, one part appeared with the legs raised above the surface of the ground, while the other rested on it. A well-informed person assured them, that he had seen, between Calabozo and Uritucu, the image of an animal inverted, without there being any direct image. They several times thought they saw on the horizon the figures of tumuli and towers, which disappeared at intervals, without their being able to discern the real shape of the objects. They were hillocks perhaps, or small eminences.

The plain assumed at sunrise a more animated aspect. The cattle which had reposed during the night along the pools, or beneath clumps of mauritias and rhopalas, were now collected in herds; and these solitudes became peopled with horses, mules, and oxen, that lived here free, without settled habitations, and disdaining the care and protection of man.

They found at Calabozo, in the midst of the Llanos, an electrical machine with large plates, electrophori, batteries, and electrometers; an apparatus nearly as complete as the first scientific men in Europe possessed. It was the work of a man who had never seen any instrument, who had no person to consult, and who was acquainted with the phenomena of electricity only by

reading the treatise of De Lafond, and Franklin's Memoirs. Señor Carlos del Pozo, the name of this ingenious man, had begun to make cylindrical electrical machines, by employing large glass jars, after having cut off the necks. It was only a few years before that he had been able to procure, by way of Philadelphia, two plates, to construct a plate machine, and to obtain more considerable effects. It is easy to judge what difficulties Señor Pozo had to encounter, since the first works upon electricity had fallen into his hands, and that he had the courage to resolve to procure himself, by his own industry, all that he had seen described in his books. Till now he had enjoyed only the astonishment and admiration produced by his experiments on persons destitute of all information, and who had never quitted the solitude of the Llanos; the abode of Humboldt and Bonpland at Calabozo gave him a satisfaction altogether new. It may be supposed that he set some value on the opinions of two travellers who could compare his apparatus with those constructed in Europe. Humboldt had brought with him electrometers mounted with straw, pith-balls, and gold-leaf; also a small Leyden jar which served for his physiological experiments. Señor del Pozo could not contain his joy on seeing for the first time instruments which he had not made, yet which appeared to be copied from his own. Humboldt showed him the effect of the contact of heterogeneous metals on the nerves of frogs. The names of Galvani and Volta had not previously been heard in those vast solitudes.

Next to the electrical apparatus, nothing at Calabozo excited in the travellers so great an interest as the gymnoti, which were animated electrical apparatuses.

Humboldt was impatient, from the time of his arrival at Cumana, to procure electrical eels. He had been promised them often, but his hopes had always been disappointed. He at first wished to make his experiments in the house he inhabited at Calabozo, but the dread of the shocks caused by the gymnoti was so great, and so exaggerated among the common people, that during three days, he could not obtain one, though they were easily enough caught, and he had promised the Indians two piastres for every strong and vigorous fish. Impatient, at last, of waiting, and having obtained very uncertain results from an electric eel which had been brought to him alive, but much enfeebled, Humboldt, accompanied by Bonpland, repaired to the Caño de Bera, to make his experiments in the open air, and at the edge of the water. They set off on the 19th of March, at a very early hour, for the village of Rastro; thence they were conducted by the Indians to a stream, which in the time of drought, formed a basin of muddy water, surrounded by fine trees. To catch the gymnoti with nets was considered very difficult, on account of the extreme agility of the fish, which buried themselves in the mud. The Indians told them that they would fish with horses. They found it difficult to form an idea of this manner of fishing; but they soon saw their guides return from the savannah, which they had been scouring for wild horses and mules. They brought about thirty with them, which they forced to enter the pool. The noise caused by the horses' hoofs, made the fish issue from the mud, and excited them to the attack. These yellowish and livid eels, resembling large aquatic serpents, swam on the surface of the water, and crowded under the bellies of the

horses and mules. A contest between animals of so different an organization presented a very striking spectacle. The Indians, provided with harpoons and long slender reeds, surrounded the pool closely, and some climbed up the trees, the branches of which extended horizontally over the surface of the water. By their wild cries, and the length of their reeds, they prevented the horses from running away and reaching the bank of the pool. The eels, stunned by the noise, defended themselves by the repeated discharge of their electric batteries. For a long interval they seemed likely to prove victorious. Several horses sank beneath the violence of the invisible strokes which they received from all sides, and stunned by the force and frequency of the shocks, they disappeared under the water. Others, panting, with mane erect, and haggard eyes expressing anguish and dismay, raised themselves, and endeavoured to flee from the storm by which they were overtaken. They were driven back by the Indians into the middle of the water; but a small number succeeded in eluding the active vigilance of the fishermen. These regained the shore, stumbling at every step, and stretched themselves on the sand, exhausted with fatigue, and with limbs benumbed by the electric shocks of the gymnoti.

In less than five minutes two of the horses were drowned. The eels being five feet long, and pressing themselves against the belly of the horses, made a discharge along the whole extent of their electric organ. They attacked at once the heart, the intestines, and the cœliac fold of the abdominal nerves. The horses were probably not killed, but only stunned. They were drowned from the impossibility of rising amid the

prolonged struggle between the other horses and the eels.

The travellers had little doubt that the fishing would terminate by killing successively all the animals engaged; but by degrees the impetuosity of this unequal combat diminished, and the wearied gymnoti dispersed. They required a long rest, and abundant nourishment, to repair the galvanic force which they lost. The mules and horses appeared less frightened; their manes were no longer bristled, and their eyes expressed less dread. The gymnoti approached timidly the edge of the marsh, where they were taken by means of small harpoons fastened to long cords. When the cords were dry the Indians felt no shock in raising the fish into the air. In a few minutes Humboldt had five large eels, most of which were but slightly wounded. Some others were taken, by the same means, towards evening.

The travellers left the town of Calabozo on the 24th, highly satisfied with their stay, and the experiments they had made on an object so worthy of the attention of physiologists. As they advanced into the southern part of the Llanos, they found the ground more dusty more destitute of herbage, and more cracked by the effect of long drought. The palm-trees disappeared by degrees. The calmer the air appeared at eight or ten feet high, the more they were enveloped in those whirlwinds of dust, caused by the currents of air that swept the ground. In the afternoon they found a young Indian girl stretched upon the savannah. She was almost in a state of nudity, and appeared to be about twelve or thirteen years of age. Exhausted with fatigue and thirst, her eyes, nostrils, and mouth filled with dust, she breathed with a rattling in

her throat, and was unable to answer their questions. A pitcher, overturned, and half-filled with sand, was lying at her side. Happily one of their mules was laden with water; and they roused the girl from her lethargic state by bathing her face, and forcing her to drink a few drops of wine. She was at first alarmed on seeing herself surrounded by so many persons; but by degrees she took courage, and conversed with their guides. She judged, from the position of the sun, that she must have remained during several hours in that state of lethargy. They could not prevail on her to mount one of their beasts of burden, and she would not return to Uritucu. She had been in service at a neighbouring farm; and she had been discharged, because at the end of a long sickness she was less able to work than before. Their menaces and prayers were alike fruitless; insensible to suffering, she persisted in her resolution of going to one of the Indian Missions near the city of Calabozo. They removed the sand from her pitcher, and filled it with water. She resumed her way along the steppe before they had remounted their horses, and was soon separated from them by a cloud of dust. During the night they forded the river Uritucu, which abounded with a breed of crocodiles remarkable for their ferocity. They were advised to prevent their dogs from going to drink in the rivers, for it often happened that the crocodiles of Uritucu came out of the water, and pursued dogs upon the shore. They were shown a hut, in which their host of Calabozo had witnessed a very extraordinary scene. Sleeping with one of his friends on a bench or couch covered with leather, he was awakened early in the morning by a violent shaking and a horrible noise.

Clods of earth were thrown into the middle of the hut. Presently a young crocodile two or three feet long issued from under the bed, darted at a dog which lay on the threshold of the door, and, missing him in the impetuosity of his spring, ran towards the beach to gain the river. On examining the spot where the couch was placed, the cause of this strange adventure was easily discovered. The ground was disturbed to a considerable depth. It was dried mud, which had covered the crocodile in that state of lethargy, or summer-sleep, in which many of the species lie during the absence of the rains in the Llanos. The noise of men and horses, perhaps the smell of the dog, had aroused the crocodile. The hut being built at the edge of the pool, and inundated during part of the year, the crocodile had no doubt entered, at the time of the inundation of the savannahs, by the same opening at which it was seen to go out.

On the 25th they traversed the smoothest part of the steppes of Caracas, the Mesa de Pavones. As far as the eye could reach, not a single object fifteen inches high could be discovered. The air was clear, and the sky of a very deep blue; but the horizon reflected a livid and yellowish light, caused by the quantity of sand suspended in the atmosphere. They met some large herds of cattle, and with them flocks of birds of a black colour with an olive shade. They had often seen them perched on the back of cows, seeking for gadflies and other insects. Like many birds of these desert places, they feared so little the approach of man, that children often caught them in their hands. In the valleys of Aragua, where they were very common, the travellers

often saw them perched upon the hammocks on which they were reposing, in open day.

On the 27th of March they arrived at the Villa de San Fernando, the capital of the Mission of the Capuchins, in the province of Varinas.

CHAPTER IV.

UP THE ORINOCO.

THE next journey that the travellers made was to the Orinoco. In the afternoon of the 30th of March, they set sail from San Fernando in a large canoe, managed by a pilot and four Indians. They constructed, near the stern, a cabin covered with palm-leaves, sufficiently spacious to contain a table and benches. These were made of ox-hides, strained tight, and nailed to frames of brazil-wood. The canoe was loaded with provisions for a month; fowls, eggs, plantains, cassava, and cocoa, not forgetting sherry wine, oranges, and tamarinds, which were given them by the Capuchins.

They soon entered a land inhabited only by tigers, crocodiles, and tapirs. They saw flocks of birds, crowded so closely together as to appear against the sky like a dark cloud which every instant changed its form. The river widened by degrees. One of its banks was barren and sandy from the effect of inundations; the other was higher, and covered with lofty trees. In some parts the river was bordered by forests on each side, and formed a straight canal nine hundred feet broad. The manner in which the trees were disposed was remarkable. First were bushes of sauso, forming a kind of hedge four feet

high, and appearing as if they had been clipped by the hand of man. A copse of cedar, brazilletto, and lignum-vitæ rose behind this hedge. Palm-trees were rare. The large quadrupeds of those regions, the jaguars, tapirs, and peccaries had made openings in the hedge of sauso, through which they passed when they came to drink at the river. As they feared but little the approach of a boat, the travellers had the pleasure of viewing them as they paced slowly along the shore till they disappeared in the forest, which they entered by one of the narrow passes left at intervals between the bushes.

When the shore was of considerable breadth, the hedge of sauso remained at a distance from the river. In the intermediate space they saw crocodiles, sometimes to the number of eight or ten, stretched on the sand. Motionless, with their jaws wide open, they reposed by each other, without displaying any of those marks of affection observed in other animals living in society. The troop separated as soon as they quitted the shore. These monstrous creatures were so numerous, that throughout the whole course of the river almost at every instant five or six were in view. Yet at this period the swelling of the Rio Apure was scarcely perceived; and consequently hundreds of crocodiles were still buried in the mud of the savannahs. About four in the afternoon Humboldt stopped to measure a dead crocodile which had been cast ashore. It was sixteen feet eight inches long; some days after Bonpland found another, a male, twenty-two feet three inches long. The Indians told them that at San Fernando scarcely a year passed without two or three grown-up persons, particularly women who fetched water from the river, being devoured by these carnivo-

rous reptiles. They related the history of a young girl of Uritucu, who, by singular intrepidity and presence of mind, saved herself from the jaws of a crocodile. When she felt herself seized, she sought the eyes of the animal, and plunged her fingers into them with such violence, that the pain forced him to let her go, after having bitten off the lower part of her left arm. Notwithstanding the enormous quantity of blood she lost, the girl reached the shore, swimming with the hand that still remained to her. In those desert countries, where man was ever wrestling with nature, discourse daily turned on the best means that might be employed to escape from a tiger, a boa, or a crocodile; every one prepared himself in some sort for the dangers that might await him. "I knew," said the young girl of Uritucu coolly, "that the cayman lets go his hold, if you push your fingers into his eyes." After his return to Europe, Humboldt learned that in the interior of Africa the negroes knew and practised the same means of defence. Isaac, the guide of the unfortunate Mungo Park, was twice seized by a crocodile, and twice escaped from the jaws of the monster, having succeeded in thrusting his fingers into the creature's eyes while under water. The African Isaac, and the young American girl, owed their safety to the same presence of mind, and the same combination of ideas.

Humboldt often saw young crocodiles biting their tails; and other observers have seen the same action in crocodiles at their full growth. If their movements almost always appear to be straight forward, it is because, like lizards, they move by starts. Crocodiles are excellent swimmers; they go with facility against the most rapid current. It appeared to Humboldt, however, that in

descending the river, they had some difficulty in turning quickly about. A large dog, which had accompanied him in his journey from Caracas to the Rio Negro, was one day pursued in swimming by an enormous crocodile. The latter had nearly reached its prey, when the dog escaped by turning round suddenly and swimming against the current. The crocodile performed the same movement, but much more slowly than the dog, which succeeded in gaining the shore.

Near the *Joval* the travellers saw the largest jaguar they had ever met with. The natives themselves were astonished at its prodigious length, which surpassed that of any Bengal tiger ever seen in the museums of Europe. The animal lay stretched beneath the shade of a large zamang. It had just killed a tapir, but had not yet touched its prey, on which it kept one of its paws. The zamuro vultures were assembled in great numbers to devour the remains of the jaguar's repast. They presented the most curious spectacle, by a singular mixture of boldness and timidity. They advanced within the distance of two feet from the animal, but at the least movement he made they drew back. In order to observe more nearly the manners of these creatures, Humboldt and Bonpland went into the little skiff that accompanied their canoe. Tigers very rarely attack boats by swimming to them; and never but when their ferocity is heightened by a long privation of food. The noise of their oars led the animal to rise slowly, and hide itself behind the sauso bushes that bordered the shore. The vultures tried to profit by this moment of absence to devour the tapir; but the tiger, notwithstanding the proximity of the boat, leaped into the midst of them,

and in a fit of rage, expressed by his gait and the movement of his tail, carried off his prey to the forest.

Continuing to descend the river, they met with a great herd of tapirs which the tiger had put to flight, and from whom he had selected his prey. These animals saw them land very unconcernedly; some were seated, and gazed upon them, moving the upper lip like rabbits. They seemed not to be afraid of man, but the sight of the dog put them to flight. Their hind legs being longer than their fore legs, their pace was a slight gallop, but with so little swiftness that the travellers succeeded in catching two of them.

They passed the night in the open air, though in a plantation, the proprietor of which employed himself in hunting tigers. He wore scarcely any clothing, and was of a dark brown complexion like a Zambo. This did not prevent his classing himself among the whites. He called his wife and his daughter, who were as naked as himself, Doña Isabella and Doña Manuela. Without having ever quitted the banks of the Apure, he took a lively interest in the news of Madrid, enquiring eagerly respecting "those never-ending wars, and everything down yonder." He knew, he said, that the king was soon to come and visit the grandees of the country of Caracas, but he added with some pleasantry, "as the people of the court can eat only wheaten bread, they will never pass beyond the town of Victoria, and we shall not see them here." Humboldt had brought with him a tapir which he had intended to have roasted; but his host assured him that such 'Indian game' was not food fit for white gentlemen like the travellers and himself. Accordingly he offered them some venison, which he

had killed the day before with an arrow, for he had neither powder nor fire-arms.

They supposed that a small wood of plantain-trees concealed the hut of the farm; but this man, so proud of his nobility and the colour of his skin, had not taken the trouble of constructing even a hut of palm-leaves. He invited them to have their hammocks hung near his own, between two trees; and he assured them with an air of complacency, that, if they came up the river in the rainy season, they should find him beneath a roof. They soon had reason to complain of a system of philosophy which was indulgent to indolence, and rendered a man indifferent to the conveniences of life. A furious wind arose after midnight, lightnings flashed over the horizon, thunder rolled, and they were wet to the skin. During this storm a whimsical incident served to amuse them for a moment. Doña Isabella's cat had perched upon the tamarind-tree, at the foot of which they lay. It fell into the hammock of one of their companions, who being hurt by the claws of the cat, and suddenly aroused from a profound sleep, imagined he was attacked by some wild beast of the forest. They ran to him on hearing his cries, and had some trouble to convince him of his error. While it rained in torrents on their hammocks and on their instruments which they had brought ashore, their host congratulated them on their good fortune in not sleeping on the strand, but finding themselves in his domain, among whites and persons of respectability. Wet as they were, they could not easily persuade themselves of the advantages of their situation, and they listened with some impatience to the long narrative which he gave of his pretended expedition to the

Rio Meta, of the valour he had displayed in a sanguinary combat with the Guahibo Indians, and the services that he had rendered to God and his king, in carrying away Indian children, from their parents, to distribute them in the Missions.

On the 1st of April, at sunrise, they quitted Señor Don Ignacio and Señora Doña Isabella his wife.

They passed the next night on a bare and extensive strand of the river. The forest on its banks being impenetrable, they had the greatest difficulty in finding dry wood to light fires. The night was calm and serene, and there was a beautiful moonlight. The crocodiles, stretched along the shore, placed themselves in such a manner as to be able to see the fire. The travellers thought they observed that its blaze attracted them, as it attracts fishes, crayfish, and other inhabitants of the water. The Indians showed them the tracks of three tigers in the sand, two of which were very young. A female had no doubt conducted her little ones to drink at the river. Finding no tree near, the travellers stuck their oars in the ground, and fastened their hammocks to them. Everything passed tranquilly till eleven at night; and then a noise so terrific arose in the neighbouring forest, that it was almost impossible to close their eyes. Amid the cries of so many wild beasts howling at once, the Indians discriminated only such as were at intervals heard separately. These were the little soft cries of the sapajous, the moans of the alouate apes, the howlings of the jaguar and couguar, the peccary, and the sloth, and the cries of the curassao, the parraka, and other gallinaceous birds. When the jaguars approached the skirt of the forest, the dog, which accompanied the

party, and which till then had never ceased barking, began to howl and seek for shelter beneath their hammocks. Sometimes, after a long silence, the cry of the tiger came from the tops of the trees; and then it was followed by the sharp and long whistling of the monkeys, which appeared to flee from the danger that threatened them. When the natives were interrogated on the causes of the tremendous noise made by the beasts of the forest at certain hours of the night, they answered, "They are keeping the feast of the full moon."

The travellers set sail on the 2d of April. The morning was beautiful and cool. The porpoises ploughed the river in long files. The shore was covered with fishing-birds. Some of these perched on the floating wood as it passed down the river, and surprised the fish that preferred the middle of the stream. The canoe was aground several times during the morning. These shocks were sufficiently violent to split a light bark. They were caused by the limbs of large trees, which had remained for years in an oblique position, sunk in the mud. Reaching a spot near the island of Carizales, they saw trunks of the locust-tree, of an enormous size, above the surface of the water. They were covered with a species of plotus, nearly resembling the white bellied darter. These birds perched in files, like pheasants, and remained for hours entirely motionless, with their beaks raised towards the sky.

It rained towards evening, and before the rain fell, swallows skimmed over the surface of the water. They saw also a flock of paroquets pursued by little goshawks. The piercing cries of these paroquets contrasted singularly with the whistling of the birds of prey. They

passed the night in the open air, upon the beach near the island of Carizales. There were several Indian huts in the neighbourhood, surrounded with plantations. Their pilot assured them beforehand that they should not hear the cries of the jaguar, which, when not extremely pressed by hunger, withdraws from places where he does not reign unmolested. "Men put him out of humour," said the people in the Missions.

They stopped at noon the next day in a spot called Algodonal. Leaving his companions while they drew the boat ashore and were occupied in preparing their dinner, Humboldt went along the beach to get a near view of a group of crocodiles sleeping in the sun, and lying in such a manner as to have their tails resting on one another. Some little herons, white as snow, walked along their backs, and even upon their heads, as if passing over trunks of trees. The crocodiles were of a greenish gray, half covered with dried mud; from their colour and immobility they might have been taken for bronze statues. This excursion had nearly proved fatal to him. He had kept his eyes constantly turned towards the river; but, whilst picking up some spangles of mica agglomerated together in the sand, he discovered the recent footsteps of a tiger, easily distinguishable from their form and size. The animal had gone towards the forest, and turning his eyes on that side, he found himself within eighty paces of a tiger that was lying under the thick foliage of a ceiba. No tiger ever appeared to him so large.

He was extremely alarmed, yet sufficiently master of himself and of his motions to enable him to follow the advice which the Indians had so often given him as to how he ought to act in such cases. He continued to

walk on without running, avoided moving his arms, and thought he observed that the jaguar's attention was fixed on a herd of capybaras which was crossing the river. He then began to return, making a large circuit toward the edge of the water. He was often tempted to look back in order to assure himself that he was not pursued! Happily he yielded very tardily to this desire. The jaguar had remained motionless. He arrived at the boat out of breath, and related his adventure to the Indians. They appeared very little interested by it; yet, after the party had loaded their guns, they accompanied him to the ceiba beneath which the jaguar had lain. He was there no longer.

The 4th of April was the last day that they passed on the Rio Apure. During several days they had suffered cruelly from the stings of zancudos, which covered their faces and hands. These insects were gnats, though very different from those that they had seen in Europe. They appeared only after sunset. Their proboscis was so long that, when they fixed on the lower surface of a hammock, they pierced through it and the thickest garments with their sting.

The travellers had intended to pass the night at the Vuelta del Palmito, but the number of jaguars at that part of the Apure was so great that the Indians found two hidden behind the trunk of a locust-tree, at the moment when they were going to sling their hammocks. Finding no trees to which they could suspend their hammocks, they were obliged to sleep on ox-hides spread on the ground. The boats were too narrow and too full of zancudos to permit them to pass the night in them.

In the place where they had landed their instruments,

the banks being very steep, they saw new proofs of the indolence of the gallinaceous birds of the tropics. The curassaos and cashew birds had the habit of going down several times a day to the river to allay their thirst. They drank a great deal, and at short intervals. A vast number of these birds had joined, near their station, a flock of pheasants. They had great difficulty in climbing up the steep banks; they attempted it several times without using their wings. The travellers drove them before them as if they had been driving sheep.

Continuing their journey they discerned towards the south the lovely hills of Coranto; while to the east the granite rocks of the Curiquima, the Sugar-loaf of Caycara, and the mountains of the Tyrant began to rise on the horizon. It was not without emotion that they beheld for the first time the waters of the Orinoco.

On leaving the Rio Apure they found themselves in a country presenting a totally different aspect. An immense plain of water stretched before them like a lake, as far as they could see. White-topped waves rose to the height of several feet, from the conflict of the breeze and the current. The air resounded no longer with the piercing cries of herons, flamingoes, and spoonbills, crossing in long files from one shore to the other. Their eyes sought in vain those water-fowls, the habits of which vary in each tribe. All nature appeared less animated. Scarcely could they discover in the hollows of the waves a few large crocodiles, cutting obliquely, by the help of their long tails, the surface of the agitated waters. The horizon was bounded by a zone of forests, which nowhere reached so far as the bed of the river. A vast beach, constantly parched by the heat of the sun, desert and

bare as the shores of the sea, resembled at a distance, from the effect of the mirage, pools of stagnant water. These sandy shores, far from fixing the limits of the river, rendered them uncertain, by enlarging or contracting them alternately, according to the variable action of the solar rays.

Struck with the extreme breadth of the Orinoco, between the mouth of the Apure and the rock Curiquima, Humboldt ascertained it by means of a base measured twice on the western beach. The bed of the Orinoco, at low water, was over six thousand feet broad; but this breadth was increased to thirty-two thousand feet in the rainy season.

The travellers first proceeded south-west, as far as the shore inhabited by the Guaricoto Indians on the left bank of the Orinoco, and then advanced straight towards the south. The river was so broad that the mountains of Encaramada appeared to rise from the water, as if seen above the horizon of the sea. They formed a continued chain from east to west. These mountains were composed of enormous blocks of granite, cleft and piled one upon another. What contributed above all to embellish the scene at Encaramada was the luxuriance of vegetation that covered the sides of the rocks, leaving bare only their rounded summits. They looked like ancient ruins rising in the midst of a forest.

In the port of Encaramada they met with some Caribs of Panapana. A cacique was going up the Orinoco in his canoe, to join in the famous fishing of turtle's eggs. His canoe was rounded toward the bottom, and followed by a smaller boat. He was seated beneath a sort of tent, constructed, like the sail, of palm-leaves. His

cold and silent gravity, the respect with which he was treated by his attendants, everything denoted him to be a person of importance. He was equipped, however, in the same manner as his Indians. They were all equally naked, armed with bows and arrows, and painted with onoto. The chief, the domestics, the furniture, the boat, and the sail were all painted red. These Caribs were men of an almost athletic stature; they appeared to the travellers much taller than any Indians they had hitherto seen. Their smooth and thick hair, cut short on the forehead like that of choristers, their eyebrows painted black, their look at once gloomy and animated, gave a singular expression to their countenances. The women, who were very tall, and disgusting from their want of cleanliness, carried their infants on their backs. The thighs and legs of the infants were bound at certain distances by broad strips of cotton cloth, and the flesh, strongly compressed beneath the ligatures, was swelled in the interstices.

Near Encaramada a very long island divided the river into two branches. They passed the night in a rocky creek, opposite the mouth of the Rio Cabullare, which was formed by the Payara and the Atamaica. The evening was beautiful. The moon illumined the tops of the granite rocks. The heat was so uniformly distributed, that, notwithstanding the humidity of the air, no twinkling of the stars was observable, even at four or five degrees above the horizon. Towards midnight, the north-east wind became extremely violent. It brought no clouds, but the vault of the sky was covered more and more with vapours. Strong gusts were felt, and made them fear for the safety of their canoe. During this

whole day they had seen very few crocodiles, but all of an extraordinary size, from twenty to twenty four feet. The Indians assured them that the young crocodiles preferred the marshes, and the rivers that were less broad and less deep.

Speaking of the mountains of Encaramada, Humboldt says that the natives of those countries had retained the belief that, "at the time of the great waters, when their fathers were forced to have recourse to boats, to escape the general inundation, the waves of the sea beat against the rocks of Encaramada." This belief was not confined to one nation singly, it made part of a system of historical tradition, of which he found scattered notions among the Maypures of the great cataracts; among the Indians of the Rio Erevato, and among almost all the tribes of the Upper Orinoco. When the Indians were asked how the human race survived this great deluge they said, "a man and a woman saved themselves on a high mountain, called Tamanacu, situated on the banks of the Asiveru; and casting behind them, over their heads, the fruits of the mauritia palm-tree, they saw the seeds contained in those fruits produce men and women, who repeopled the earth." A few leagues from Encaramada, a rock, called "the painted rock," rose in the midst of the savannah. Upon it were traced representations of animals and symbolic figures. Between the banks of the Cassiquiare and the Orinoco, between Encaramada, the Capuchino, and Caycara, these hieroglyphic figures were often seen at great heights, on rocky cliffs which could be accessible only by constructing very lofty scaffolds. When the natives were asked how those figures could have been sculptured, they answered with a smile, as if

relating a fact of which only a white man could be ignorant, that "at the period of the great waters, their fathers went to that height in boats."

A fresh breeze carrying the travellers towards the Boca de la Tortuga they landed at an island in the middle of the river. This island was celebrated for the turtle-fishery, or, as it was called there, "the harvest of eggs," that took place annually. Here the travellers found an assemblage of Indians, encamped under huts made of palm-leaves. This encampment contained more than three hundred persons. Accustomed, since they had left San Fernando de Apure, to see only desert shores they were singularly struck by the bustle that prevailed here. They found, besides the Guamos and the Ottomacs of Uruana, who were both considered as savage races, Caribs, and other Indians of the Lower Orinoco. Every tribe was separately encamped, and was distinguished by the pigments with which their skins were painted. Some white men were seen amidst this tumultuous assemblage, chiefly pulperos, or little traders of Angostura, who had come up the river to purchase turtle-oil from the natives. The missionary of Uruana, a native of Alcala, came to meet Humboldt and Bonpland, and he was extremely astonished at seeing them. After having admired their instruments, he gave them an exaggerated picture of the sufferings to which they would be necessarily exposed in ascending the Orinoco beyond the cataracts. The object of their journey appeared to him very mysterious. "How is it possible to believe," said he, "that you have left your country, to come and be devoured by mosquitos on this river, and to measure lands that are not your own?" They were happily furnished with recommendations from

the Superior of the Franciscan Missions, and the brother in-law of the Governor of Varinas, who accompanied them, soon dissipated the doubts to which their dress, their accent, and their arrival in this sandy island, had given rise among the Whites. The missionary invited them to partake a frugal repast of fish and plantains. He told them that he had come to encamp with the Indians during the time of the harvest of eggs, "to celebrate mass every morning in the open air; to procure the oil necessary for the church-lamps, and especially to govern this mixed republic in which every one wished to profit singly by what God had granted to all."

They made the tour of the island, accompanied by the missionary and by a trader, who boasted of having, for ten successive years, visited the camp of the Indians, and attended the turtle-fishery. They were on a plain of sand perfectly smooth; and were told that, as far as they could see along the beach, turtles' eggs were concealed under a layer of earth. The missionary carried a long pole in his hand. He showed them, that by means of this pole, the extent of the stratum of eggs could be determined as accurately as the miner determines the limits of a bed of marl, of bog iron-ore, or of coal. On thrusting the rod perpendicularly into the ground, the sudden want of resistance showed that the cavity or layer of loose earth, containing the eggs, had been reached. They saw that the stratum was generally spread with so much uniformity, that the pole found it everywhere in a radius of sixty feet around any given spot. Here they talked continually of square perches of eggs; it was like a mining-country, divided into lots, and worked with the greatest regularity. The stratum of eggs, however, was

far from covering the whole island; they were not found wherever the ground rose abruptly, because the turtle could not mount heights. The Indians assured them that, in going up the Orinoco from its mouth to its junction with the Apure, not one island or one beach was to be found, where eggs could be collected in abundance. The great turtle dreads places inhabited by men, or much frequented by boats. It is a timid and mistrustful animal, raising only its head above the water, and hiding itself at the least noise.

The period at which it lays its eggs coincides with the period of the lowest waters. The Orinoco beginning to increase from the vernal equinox, the lowest flats are found uncovered from the end of January till the 20th or 25th of March. The turtles collect in troops in the month of January, then issue from the water, and warm themselves in the sun, reposing on the sands. The Indians believed that great heat was indispensable to the health of the animal, and that its exposure to the sun favoured the laying of the eggs. They are found on the beach a great part of the day during the whole month of February. At the beginning of March the straggling troops assemble, and swim towards the small number of islands on which they habitually deposit their eggs. At this period, a few days before they lay their eggs, thousands of these animals may be seen ranged in long files, on the borders of the islands of Cucuruparu, Uruana, and Pararuma, stretching out their necks and holding their heads above water, to see whether they have anything to dread. The Indians, who are anxious that the bands when assembled should not separate, that the turtles should not disperse, and that the laying of the eggs

should be performed tranquilly, place sentinels at certain distances along the shore. The people who pass in boats are told to keep in the middle of the river, and not frighten the turtles by cries. The laying of the eggs takes place always during the night, and it begins soon after sunset. With its hind feet, which are very long, and furnished with crooked claws, the animal digs a hole of three feet in diameter and two in depth. These turtles feel so pressing a desire to lay their eggs, that some of them descend into holes that have been dug by others, but which are not yet covered with earth. There they deposit a new layer of eggs on that which has been recently laid. In this tumultuous movement an immense number of eggs are broken. The missionary showed the travellers, by removing the sand in several places, that this loss probably amounted to a fifth of the whole quantity. The yelk of the broken eggs contributes, in drying, to cement the sand; and they found very large concretions of grains of quartz and broken shells. The number of animals working on the beach during the night is so considerable, that day surprises many of them before the laying of their eggs is terminated. They are then urged on by the double necessity of depositing their eggs, and closing the holes they have dug, that they may not be perceived by the jaguars. The turtles that thus remain too late are insensible to their own danger. They work in the presence of the Indians, who visit the beach at a very early hour, and who call them 'mad turtles.' Notwithstanding the rapidity of their movements, they are then easily caught with the hand.

The encampments formed by the Indians began about the end of March or commencement of April. The

gathering of the eggs was conducted in a uniform manner, and with that regularity which characterizes all monastic institutions. Before the arrival of the missionaries on the banks of the river, the Indians profited much less from a production which nature has supplied in such abundance. Every tribe searched the beach in its own way, and an immense number of eggs were uselessly broken, because they were not dug up with precaution, and more eggs were uncovered than could be carried away. It was like a mine worked by unskilful hands.

When the camp was formed, the missionary of Uruana named his lieutenant, or commissary, who divided the ground where the eggs were found into different portions, according to the number of the Indian tribes who took part in the gathering. The lieutenant began his operations by sounding. He examined by means of a long wooden pole or cane of bamboo, how far the stratum of eggs extended. This stratum, according to the measurements of Humboldt, extended to the distance of one hundred and twenty feet from the shore. Its average depth was three feet. The lieutenant placed marks to indicate the point where each tribe should stop its labours. The Indians removed the earth with their hands; they placed the eggs they had collected in small baskets, carried them to their encampment, and threw them into long troughs of wood filled with water. In these troughs the eggs, broken and stirred with shovels, remained exposed to the sun till the oily part, which swam on the surface, had time to inspissate. As fast as this collected on the surface of the water, it was taken off and boiled over a quick fire. This animal oil, called turtle butter, kept the better in proportion as it had undergone a strong

ebullition. When well prepared, it was limpid, inodorous, and scarcely yellow. The missionaries compared it to the best olive oil, and it was used not merely for burning in lamps, but for cooking. It was not easy, however, to procure oil of turtles' eggs quite pure. It had generally a putrid smell, owing to the mixture of eggs in which the young were already formed. The Indians brought away a great number of eggs to eat them dried in the sun; and they broke a considerable number through carelessness during the gathering. The number of eggs that were hatched before the people could dig them up was so prodigious, that near the encampment of Uruana Humboldt saw the whole shore of the Orinoco swarming with little turtles an inch in diameter, escaping with difficulty from the pursuit of the Indian children.

At the Playa de huevos where their pilot had anchored to purchase provisions, their store having begun to run short, the travellers found fresh meat, Angostura rice, and even biscuit made of wheat-flour. Their Indians filled the boat with little live turtles, and eggs dried in the sun, for their own use. Having taken leave of the missionary of Uruana, who had treated them with great kindness, they set sail about four in the afternoon. The wind was fresh, and blew in squalls. Since they had entered the mountainous part of the country, they had discovered that their canoe carried sail very badly; but the master was desirous of showing the Indians who were assembled on the beach, that, by going close to the wind, he could reach, at one single tack, the middle of the river. At the very moment when he was boasting of his dexterity, and the boldness of his manœuvre, the force of the wind upon the sail became so great that they

were on the point of going down. One side of the boat was under water, which rushed in with such violence that it was soon up to their knees. It washed over a little table at which Humboldt was writing at the stern of the boat. He had some difficulty in saving his journal, and in an instant they saw their books, papers, and dried plants, all afloat. Bonpland was lying asleep in the middle of the canoe. Awakened by the entrance of the water and the cries of the Indians, he understood the danger of their situation, whilst he maintained a coolness which he always displayed in the most difficult circumstances. The lee-side righting itself from time to time during the squall, he did not consider the boat as lost. He thought that, were they even forced to abandon it, they might save themselves by swimming, since there were no crocodiles in sight. Amidst this uncertainty the cordage of the sail suddenly gave way. The same gust of wind, that had thrown them on their beam, served also to right them. They laboured to bail the water out of the boat with calabashes, the sail was again set, and in less than half an hour they were in a state to proceed. The wind now abated a little. Squalls alternating with dead calms were common in that part of the Orinoco which was bordered by mountains. They were very dangerous for boats deeply laden, and without decks. The travellers had escaped by a miracle. To the reproaches that were heaped on their pilot for having kept too near the wind, he replied with the phlegmatic coolness peculiar to the Indians, observing "that the whites would find sun enough on those banks to dry their papers." They lost only one book, the first volume of the "Genera Plantarum" of Schreber, which had fallen overboard. At

nightfall they landed on a barren island in the middle of the river, near the mission of Uruana. They supped in a clear moonlight, seating themselves on some large turtle-shells that were found scattered about the beach.

On the 8th the travellers passed the mouths of the Sua pure and the Caripo, on the east, and the outlet of the Sinaruco on the west. This last river was, next to the Rio Arauca, the most considerable between the Apure and the Meta. The Suapure, full of little cascades, was celebrated among the Indians for the quantity of wild honey obtained from the forests in its neighbourhood.

Early on the following morning the travellers arrived at the beach of Pararuma, where they found an encampment of Indians. They had assembled to search the sands, for collecting the turtles' eggs, and extracting the oil; but they had unfortunately made a mistake of several days. The young turtles had come out of their shells before the Indians had formed their camp; and consequently the crocodiles, and a species of large white herons, availed themselves of the delay. These animals, and birds fond of the flesh of young turtles, devour an innumerable quantity. They fish during the night, for the young turtles do not come out of the earth to gain the neighbouring river till after the evening twilight. The zamuro vultures are too indolent to hunt after sunset. They stalk along the shores in the daytime, and alight in the midst of the Indian encampment to steal provisions; but they often find no other means of satisfying their voracity than by attacking young crocodiles of seven or eight inches long, either on land, or in water of little depth. It was curious to see the address with which these little animals defended themselves for a time against the vul-

tures. As soon as they perceived the enemy they raised themselves on their fore paws, bent their backs, and lifted up their heads, opening their wide jaws. They turned continually, though slowly, towards their assailant to show him their teeth, which even when the animal had but recently issued from the egg, were very long and sharp. Often while the attention of a young crocodile was wholly engaged by one of the zamuros, another seized the favourable opportunity for an unforeseen attack. He pounced on the animal, grasped him by the neck, and bore him off to the higher regions of the air.

They found among the Indians assembled at Pararuma some white men, who had come from Angostura to purchase the turtle-butter. After having wearied the travellers for a long time with their complaints of the bad harvest, and the mischief done by the tigers among the turtles, at the time of laying their eggs, they conducted them beneath an ajoupa, that rose in the centre of the Indian camp. They found there the missionary-monks of Carichana and the Cataracts seated on the ground playing at cards, and smoking tobacco in long pipes. From their ample blue garments, their shaven heads, and their long beards, they might have been mistaken for natives of the East. These poor priests received them in the kindest manner, giving them every information necessary for the continuance of their voyage. They had suffered from tertian fever for some months; and their pale and emaciated aspect easily convinced the travellers that the countries they were about to visit were not without danger to their health.

The Indian pilot who had brought them from San Fernando de Apure as far as the shore of Pararuma, was

unacquainted with the passage of the rapids of the Orinoco, and would not undertake to conduct their bark any farther. They were obliged to conform to his will. Happily for them, the missionary of Carichana consented to sell them a fine canoe at a very moderate price: and Father Bernardo Zea, missionary of the Atures and Maypures near the great cataracts, offered, though still unwell, to accompany them as far as the frontiers of Brazil.

Most of the missionaries of the Upper and Lower Orinoco permitted the Indians of their Missions to paint their skins; some of them even speculated on this barbarous practice of the natives. In their huts, pompously called convents, Humboldt often saw stores of chica, which they sold as high as four francs the cake. To form a just idea of the extravagance of the decoration of these naked Indians, he tells us that a man of large stature gains with difficulty enough by the labour of a fortnight, to procure in exchange the chica necessary to paint himself red. Thus as we say in temperate climates, of a poor man, "he has not enough to clothe himself," the Indians of the Orinoco say, "that man is so poor, that he has not enough to paint half his body."

Humboldt was surprised to see, that, the women far advanced in years, were more occupied with their ornaments than the youngest women. He saw an Indian female of the nation of the Ottomacs employing two of her daughters in the operation of rubbing her hair with the oil of turtles' eggs, and painting her back with anato and caruto. The ornament consisted of a sort of lattice-work formed of black lines crossing each other on a red ground. Each little square had a black dot in the centre. It was a work of incredible patience. He returned from

a very long herborization, and the painting was not half finished.

The Indians were not always satisfied with one colour uniformly spread; they sometimes imitated in the most whimsical manner, in painting their skin, the form of European garments. The travellers saw some at Pararuma, who were painted with blue jackets and black buttons. The missionaries related to them that the Guaynaves of the Rio Caura were accustomed to stain themselves red with anato, and to make broad transverse stripes on the body, on which they stuck spangles of silvery mica. Seen at a distance, these naked men appeared to be dressed in laced clothes.

The travellers had an excellent opportunity while on the Orinoco of examining several animals in their natural state, which, till then, they had seen only in the collections of Europe. These little animals formed a branch of commerce for the missionaries. They exchanged tobacco, resin, the pigment of chica, rock-manakins, orange monkeys, capuchin monkeys, and other species of monkeys in great request on the coast, for cloth, nails, hatchets, fish-hooks, and pins. The productions of the Orinoco were bought at a low price from the Indians, who lived in dependence on the monks; and these same Indians purchased fishing and gardening implements from the monks at a very high price, with the money they gained at the egg-harvest. Humboldt and Bonpland bought several animals, which they kept throughout the rest of their passage on the river, and studied their manners. Among these was a little monkey called the titi.

No other monkey has so much the physiognomy of a child as the titi; there is the same expression of inno-

cence, the same playful smile, the same rapidity in the transition from joy to sorrow. Its large eyes are instantly filled with tears, when it is seized with fear. It is extremely fond of insects, particularly of spiders. The sagacity of this little animal is so great that one brought in their boat to Angostura distinguished perfectly the different plates annexed to one of Cuvier's works on Natural History. The engravings of this work were not coloured; yet the titi advanced rapidly its little hand in the hope of catching a grasshopper or a wasp, every time the travellers showed it the plate, on which these insects were represented. It remained perfectly indifferent when it was shown engravings of skeletons or heads of mammiferous animals. When several of these little monkeys, shut up in the same cage, were exposed to the rain, they twisted their tail round their neck, and intertwined their arms and legs to warm one another. The hunters told the travellers that in the forests they often met groups of ten or twelve of these animals, whilst others sent forth lamentable cries, because they wished to enter the group to find warmth and shelter. By shooting arrows dipped in weak poison at one of these groups, a great number of young monkeys are taken alive at once. The titi in falling remains clinging to its mother, and if it be not wounded by the fall, it does not quit the shoulder or the neck of the dead animal. Most of those that were found alive in the huts of the Indians, had been taken thus from the dead bodies of their mothers.

To gain something in breadth in their narrow canoe the travellers constructed a sort of lattice-work on the stern with branches of trees, that extended on each side

beyond the gunwale. Unfortunately, the roof of leaves, that covered this lattice-work, was so low that they were obliged to lie down, without seeing anything, or, if seated, to sit nearly double. The necessity of carrying the canoe across the rapids, and even from one river to another, and the fear of giving too much hold to the wind, by making the roof higher, rendered this construction necessary. The roof was intended to cover four persons, lying on the deck or lattice-work of brush-wood; but their legs reached far beyond it, and when it rained half their bodies were wet. Their couches consisted of ox-hides or tiger-skins, spread upon branches of trees, which were painfully felt through so thin a covering. The fore part of the boat was filled with Indian rowers, furnished with paddles, three feet long, in the form of spoons. They were all naked, seated two by two, and they kept time in rowing with a surprising uniformity, singing songs of a sad and monotonous character. The small cages containing the birds and the monkeys of the travellers, the number of which increased as they advanced, were hung, some to the roof and others to the bow of the boat. This was their travelling menagerie. Every night, when they established their watch, their collection of animals and instruments occupied the centre; around these were placed first their hammocks, then the hammocks of the Indians; and on the outside were the fires which were thought indispensable against the attacks of the jaguar.

In a canoe not three feet wide, and so encumbered, there remained no other place for the dried plants, trunks, sextants, dipping-needles, and the meteorological instruments, than the space below the lattice-work of

branches, on which Humboldt and Bonpland were compelled to remain stretched the greater part of the day. If they wished to take the least object out of a trunk, or to use an instrument, it was necessary to row ashore and land. To these inconveniences were joined the torment of the mosquitos which swarmed under the roof, and the heat radiated from the leaves of the palm-trees, the upper surface of which was continually exposed to the solar rays. They attempted every instant, but always without success, to mend their situation. While one of them hid himself under a sheet to ward off the insects, the other insisted on having green wood lighted beneath the roof in the hope of driving away the mosquitos by the smoke. The painful sensations of the eyes, and the increase of heat, already stifling, rendered both these contrivances alike impracticable.

On the 11th of April they found the course of the river encumbered by blocks of granite rocks. They passed on the west the Caño Orupe, and then a great rock known by the name of the Rock of the Tiger. The river there was so deep, that no bottom could be found with a line of twenty-two fathoms. Towards evening the weather became cloudy and gloomy. The proximity of the storm was marked by squalls alternating with dead calms. The rain was violent, and the roof of foliage, under which the travellers lay, afforded but little shelter. Happily these showers drove away the mosquitos for some time. They found themselves before the cataract of Cariven, and the impulse of the waters was so strong, that they had great difficulty in gaining the land. They were continually driven back to the middle of the current. At length two Salive Indians, excellent swimmers,

leaped into the water, and having drawn the boat to shore by means of a rope, made it fast to a shelf of bare rock, on which they passed the night. The thunder continued to roll during a part of the night; the swell of the river became considerable; and they were several times afraid that their frail bark would be driven from the shore by the impetuosity of the waves.

The next day they found the bed of the river, to the length of thirty-six hundred feet, full of granite rocks. They passed through channels that were not five feet broad. Their canoe was sometimes jammed between two blocks of granite. When the current was too violent to be resisted the rowers leaped into the water, and fastened a rope to the point of a rock, to warp the boat along. This manœuvre was very tedious; and the travellers sometimes availed themselves of it, to climb the rocks among which they were entangled. The rocks were of all dimensions, rounded, very black, glossy like lead, and destitute of vegetation. It was an extraordinary phenomenon to see the waters of one of the largest rivers on the globe in some sort disappear. They perceived, even far from the shore, those immense blocks of granite rising from the ground, and leaning one against another. The intervening channels in the rapids were more than twenty-five fathoms deep; and were the more difficult to be observed, as the rocks were often narrow towards their bases, and formed vaults suspended over the surface of the river.

From the mouth of the Meta, the Orinoco appeared to be freer of shoals and rocks. They navigated in a channel three thousand feet broad. The Indians remained rowing in the boat, without towing or pushing it forward

with their arms, and wearying the travellers with their wild cries. It was night when they reached the Cataract of Tabaje. As the Indians would not hazard passing the cataract, they slept on a very incommodious spot, on the shelf of a rock, with a slope of more than eighteen degrees, and of which the crevices sheltered a swarm of bats. They heard the cries of the jaguar very near them during the whole night. The jaguars were answered by their great dog in lengthened howlings. Humboldt waited the appearance of the stars in vain: the sky was exceedingly black; and the hoarse sounds of the cascades of the Orinoco mingled with the rolling of the distant thunder.

Early in the morning of the 13th they passed the rapids of Tabaje, and again disembarked. Father Zea, who accompanied them, desired to perform mass in the New Mission of San Borja, established two years before. They found there six houses inhabited by uncatechised Guahibos. They differed in nothing from the wild Indians. Their eyes, which were large and black, had more vivacity than those of the Indians who inhabited the ancient missions. They were offered brandy, but they would not even taste it. The faces of all the young girls were marked with round black spots; like the patches by which the ladies of Europe formerly imagined they set off the whiteness of their skins. The bodies of the Guahibos were not painted. Several of them had beards, of which they seemed proud; and, taking the white men by the chin, they showed them by signs, that they were made like them.

The Orinoco, in running from south to north, was crossed by a chain of granitic mountains. Twice con-

fined in its course, it turbulently broke on the rocks. Nothing could be grander than the aspect of this spot. It was traversed, in an extent of more than five miles, by innumerable dikes of rock, forming so many natural dams. The space between these dikes was filled with islands of different dimensions; some hilly, divided into several peaks, and twelve or fifteen hundred feet in length, others small, low, and like mere shoals. These islands divided the river into a number of torrents, which boiled up as they broke against the rocks. The jaguas and cucuritos with plumy leaves, with which all the islands were covered, seemed like groves of palm-trees rising from the foamy surface of the waters. Blocks of granite were heaped together, as in the moraines which the glaciers of Switzerland drive before them. The river was ingulfed in caverns; and in one of these caverns the travellers heard the water roll at once over their heads and beneath their feet. The Orinoco seemed divided into a multitude of arms or torrents, each of which sought to force a passage through the rocks. They were struck with the little water to be seen in the bed of the river, the frequency of subterraneous falls, and the tumult of the waters breaking on the rocks in foam.

From Caracas the travellers proceeded to Atures. The missionary at Atures related to them a striking instance of the familiarity of a jaguar. Some months before their arrival, a jaguar, which was thought to be young, though of a large size, had wounded a child in playing with him. The facts of this case, which were verified to them on the spot, are not without interest in the history of the manners of animals. Two Indian children, a boy and a girl, about eight and nine years of age, were seated on the

grass near the village of Atures, in the middle of a savannah. At two o'clock in the afternoon, a jaguar issued from the forest, and approached the children, bounding around them; sometimes he hid himself in the high grass, sometimes he sprang forward, his back bent, his head hung down, in the manner of a cat. The little boy, ignorant of his danger, seemed to be sensible of it only when the jaguar with one of his paws gave him some blows on the head. These blows, at first slight, became ruder and ruder; the claws of the jaguar wounded the child, and the blood flowed freely. The little girl then took a branch of a tree, struck the animal, and it fled from her. The Indians ran up at the cries of the children, and saw the jaguar, which bounded off without making the least show of resistance.

The little boy, who was brought to the travellers, appeared lively and intelligent. The claw of the jaguar had torn away the skin from the lower part of the forehead, and there was a second scar at the top of the head.

Among the cataracts of Atures the travellers began to hear of the hairy man of the woods, that carried off women, constructed huts, and sometimes ate human flesh. The Tamancas called it achi, and the Maypures vasitri, or "great devil." The natives and the missionaries had no doubt of the existence of this man-shaped monkey, of which they entertained a singular dread. Father Gili gravely relates the history of a lady in the town of San Carlos, in the Llanos of Venezuela, who much praised the gentle character and attentions of the man of the woods. She is stated to have lived several years with one in great domestic harmony, and only requested some

hunters to take her back, "because she and her children (a little hairy also) were weary of living far from the church and the sacraments." The travellers did not see this mythical hairy man.

They were horribly tormented in the day by mosquitos and the jejen, a small venomous fly, and at night by the zancudos. Their hands began to swell considerably, and this swelling increased daily till their arrival on the banks of the Temi. The means that were employed to escape from these little plagues were extraordinary. The good missionary Bernardo Zea, who passed his life tormented by mosquitos, had constructed near the church, on a scaffolding of palm-trees, a small apartment, in which the travellers breathed more freely. To this they went up in the evening, by means of a ladder, to dry their plants and write their journal. The missionary had observed, that the insects abounded more particularly in the lowest strata of the atmosphere, that which reaches from the ground to the height of twelve or fifteen feet. At Maypures the Indians quitted the village at night, to go and sleep on the little islets in the midst of the cataracts. There they enjoyed some rest, the mosquitos appearing to shun air loaded with vapours. The travellers found everywhere fewer in the middle of the river than near its banks.

In the missions of the Orinoco, in the villages on the banks of the river, surrounded by immense forests, the plague of the mosquitos, afforded an inexhaustible subject of conversation. When two persons met in the morning, the first questions they addressed to each other were: "How did you find the zancudos during the night? How are we to-day for the mosquitos?" These

questions reminded Humboldt of a Chinese form of politeness, which indicated the ancient state of the country where it took birth. Salutations were formerly made in the Celestial Empire in the following words, "Have you been incommoded in the night by the serpents?"

"How comfortable must people be in the moon!" said a Salive Indian to Father Gumilla; "She looks so beautiful and so clear, that she must be free from mosquitos." These words which denoted the infancy of a people were remarkable. The satellite of the earth appears to all savage nations the abode of the blessed, the country of abundance. The Esquimaux, who counts among his riches a plank or trunk of a tree, thrown by the currents on a coast destitute of vegetation, sees in the moon plains covered with forests; the Indian of the forests of Orinoco beholds there open savannahs, where the inhabitants are never stung by mosquitos.

At Mandavaca the travellers found an old missionary, who told them with an air of sadness, that he had had "his twenty years of mosquitos in America." He desired them to look at his legs, "that they might be able to tell one day beyond the sea, what the poor monks suffer in the forests of Cassiquiare." Every sting leaving a small darkish brown point, his legs were so speckled that it was difficult to recognise the whiteness of his skin, through the spots of coagulated blood. What appeared to the travellers singular, was that the different species did not associate together, and that at different hours of the day they were stung by distinct species. Every time that the scene changed, and, to use the simple expression of the missionaries, other insects "mounted guard," they had a few minutes, often a quar-

ter of an hour, of repose. The insects that disappeared did not have their places instantly supplied by their successors. From half-past six in the morning till five in the afternoon, the air was filled with mosquitos. An hour before sunset a species of small gnat took the place of the mosquitos. Their presence scarcely lasted an hour and a half; they disappeared between six and seven in the evening, or, as they said there, after the Angelus. After a few minutes' repose, the travellers would be stung by zancudos, another species of gnat with very long legs. The zancudo, the proboscis of which contains a sharp-pointed sucker, caused the most acute pain, and a swelling that remained several weeks. Its hum resembled that of the European gnat, but was louder and more prolonged. In the day-time, and even when labouring at the oar, the natives, in order to chase the insects, were continually giving one another smart slaps with the palm of the hand. They even struck themselves and their comrades mechanically during their sleep. Near Maypures the travellers saw some young Indians seated in a circle and rubbing cruelly each other's backs with the bark of trees dried at the fire. Indian women were occupied, with a degree of patience of which the copper-coloured race alone are capable, in extracting, by means of a sharp bone, the little mass of coagulated blood that formed the centre of every sting, and gave the skin a speckled appearance. One of the most barbarous nations of the Orinoco, that of the Ottomacs, was acquainted with the use of mosquito-curtains, woven from the fibres of the moriche palm-tree. At Higuerote, on the coast of Caracas, the copper-coloured people slept buried in the sand. In the villages of the Rio Magda-

lena the Indians often invited the travellers to stretch themselves on ox-skins, near the church, in the middle of the great square, where they had assembled all the cows in the neighbourhood. The proximity of cattle gives some repose to man. The Indians of the Upper Orinoco and the Cassiquiare, seeing that Bonpland could not prepare his herbal, owing to the continual torment of the mosquitos, invited him to enter their ovens. Thus they called the little chambers, without doors or windows, into which they crept horizontally through a very low opening. When they had driven away the insects by means of a fire of wet brushwood, which emitted a great deal of smoke, they closed the opening of the oven. The absence of the mosquitos was purchased dearly enough by the excessive heat of the stagnated air, and the smoke of a torch of copal, which lighted the oven during their stay in it. Bonpland, with courage and patience well worthy of praise, dried hundreds of plants, shut up in these ovens of the Indians.

They embarked on the morning of the 17th of April. On the 18th they stopped at the mouth of the Rio Tomo. The Indians went on shore, to prepare their food, and take some repose. When the travellers reached the foot of the Cataract of the Guahibos it was near five in the afternoon. It was extremely difficult to go up the current against a mass of water, precipitated from a bank of gneiss several feet high. An Indian threw himself into the water, to reach, by swimming, the rock that divided the cataract into two parts. A rope was fastened to the point of this rock, and when the canoe was hauled near enough, their instruments, their dry plants, and the provision they had collected at Atures, were landed in the

cataract itself. They remarked with surprise, that the natural dam over which the river was precipitated, presented a dry space of considerable extent, where they stopped to see the boat go up.

The rock of gneiss exhibited circular holes, the largest of which were four feet deep, and eighteen inches wide. These funnels contained quartz pebbles, and appeared to have been formed by the friction of masses rolled along by the impulse of the waters. Their situation, in the midst of the cataract, was singular enough, but unattended by the smallest danger. The missionary, who accompanied them, had his fever-fit on him. In order to quench the thirst by which he was tormented, the idea suggested itself to them of preparing a refreshing beverage for him in one of the excavations of the rock. They had taken on board at Atures an Indian basket filled with sugar, limes, and grenadillas. As they were destitute of large vessels for holding and mixing liquids, they poured the water of the river, by means of a calabash, into one of the holes of the rock: to this they added sugar and lime-juice. In a few minutes they had an excellent beverage.

After an hour of expectation they saw their boat arrive above the cataract, and were soon ready to depart. They were now overtaken by a storm, accompanied happily by no wind, but the rain fell in torrents. After rowing awhile, the pilot declared, that, far from gaining upon the current, they were again approaching the cataract. These moments of uncertainty appeared to them very long; the Indians spoke only in whispers, as they always did when they thought their situation perilous. They redoubled their efforts, and the travellers arrived

at nightfall, without any accident, in the port of Maypures. The night was extremely dark, and it was two hours or more before they could reach the village. They were wet to the skin. In proportion as the rain ceased, the zancudos re-appeared, with that voracity which tipulary insects always display immediately after a storm. Their fellow-travellers were uncertain whether it would be best to stop in the port or proceed on their way on foot, in spite of the darkness of the night. Father Zea was determined to reach his home. He had given directions for the construction of a large house of two stories, which was to be begun by the Indians of the mission. "You will there find," said he gravely, "the same conveniences as in the open air; I have neither a bench nor a table, but you will not suffer so much from the flies, which are less troublesome in the mission than on the banks of the river." They followed the counsel of the missionary, who caused torches of copal to be lighted. They walked at first over beds of rock, which were bare and slippery, and then entered a thick grove of palm-trees. They were twice obliged to pass a stream on trunks of trees hewn down. The torches had already ceased to give light. Being formed on a strange principle, the woody substance which resembled the wick surrounding the resin, they emitted more smoke than light, and were easily extinguished. The Indian pilot, who expressed himself with some facility in Spanish, told the travellers of snakes, water-serpents, and tigers, by which they might be attacked.

Arriving during the night at Maypures they were forcibly struck by the solitude of the place; the Indians were plunged in profound sleep, and nothing was heard

but the cries of nocturnal birds, and the distant sound of the cataract. In the calm of the night, amid the deep repose of nature, the monotonous sound of a fall of water had in it something sad and solemn. They remained three days at Maypures.

Humboldt and Bonpland were enraptured with the cataract of Maypures, and they often visited the little mountain of Manimi to gaze upon it. A foaming surface of four miles in length presented itself at once to the eye: iron-black masses of rock, resembling ruins and battlemented towers, rose frowning from the waters. Rocks and islands were adorned with the luxuriant vegetation of the tropical forest; a perpetual mist hovered over the waters, and the summits of the lofty palms pierced through the clouds of spray and vapour. When the rays of the glowing evening sun were refracted in these humid exhalations a magic optical effect began. Coloured bows shone, vanished and reappeared; and the ethereal image was swayed to and fro by the breath of the sportive breeze. During the long rainy season the streaming waters brought down islands of vegetable mould, and thus the naked rocks were studded with bright flower-beds adorned with Melastomas and Droseras, and with small silver-leaved mimosas and ferns.

The calm of the atmosphere, and the tumultuous movement of the waters, produced a contrast peculiar to this zone. Here no breath of wind ever agitated the foliage, no cloud veiled the splendour of the heaven; a great mass of light was diffused in the air, on the earth strewn with plants with glossy leaves, and on the bed of the river, which extended as far as the eye could reach.

They spent two days and a half in the little village of Maypures, on the banks of the great Upper Cataract, and on the 21st of April embarked in the canoe they had obtained from the missionary of Carichana. It was much damaged by the shoals it had struck against, and the carelessness of the Indians; but still greater dangers awaited it. It had to be dragged over land, across an isthmus of thirty-six thousand feet; from the Rio Tuamini to the Rio Negro, to go up by the Cassiquiare to the Orinoco, and to repass the two cataracts.

They landed at the mouth of the Rio Vichada or Visata to examine the plants of that part of the country. The scenery was very singular. The forest was thin, and an innumerable quantity of small rocks rose from the plain. These formed massy prisms, ruined pillars, and solitary towers fifteen or twenty feet high. Some were shaded by the trees of the forest, others had their summits crowned with palms.

Passing the Caño Pirajavi on the east, and then a small river on the west, they rested on the night of the 22d on the shore of the Orinoco, at the mouth of the Zama. Notwithstanding the "black waters" of the Zama, they suffered greatly from insects. The night was beautiful, without a breath of wind in the lower regions of the atmosphere, but towards two in the morning they saw thick clouds crossing the zenith rapidly from east to west. When, declining towards the horizon, they traversed the great nebulæ of Sagittarius and the Ship, they appeared of a dark blue.

The travellers left the mouth of the Zama at five in the morning of the 23d. The river continued to be skirted on both sides by a thick forest. The mountains on the

east seemed gradually to retire farther back. They passed first the mouth of the Rio Mataveni, and afterwards an islet of a very singular form; a square granitic rock that rose in the middle of the water. It was called by the missionaries the Little Castle. They passed the night on the right bank opposite the mouth of the Rio Siucurivapu, near a rock called Aricagua. During the night an innumerable quantity of bats issued from the clefts of the rock, and hovered around their hammocks.

On the 24th a violent rain obliged them early to return to their boat. They departed at two o'clock, after having lost some books, which they could not find in the darkness of the night, on the rock of Aricagua. The river ran straight from south to north; its banks were low, and shaded on both sides by thick forests. They passed the mouths of the Ucata, the Arapa, and the Caranaveni. About four in the afternoon they landed at the Indian plantations of the mission of San Fernando. The good people wished to detain them among them, but they continued to go up against the current, which ran at the rate of five feet a second. They entered the mouth of the Guaviare on a dark night, passed the point where the Rio Atabapo joins the Guaviare, and arrived at the mission after midnight. They were lodged as usual at the Convent, that is, in the house of the missionary, who, though much surprised at their unexpected visit, nevertheless received them with the greatest hospitality.

During the night, they had left, almost unperceived, the waters of the Orinoco; and at sunrise found themselves as if transported to a new country, on the banks of a river the name of which they had scarcely ever heard pronounced, and which was to conduct them, by

the portage of Pimichin, to the Rio Negro, on the frontiers of Brazil. "You will go up," said the president of the missions, who resided at San Fernando, "first the Atabapo, then the Temi, and finally, the Tuamini. When the force of the current of 'black waters' hinders you from advancing, you will be conducted out of the bed of the river through forests, which you will find inundated. Two monks only are settled in those desert places, between the Orinoco and the Rio Negro; but at Javita you will be furnished with the means of having your canoe drawn over land in the course of four days to Caño Pimichin. If it be not broken to pieces you will descend the Rio Negro without any obstacle (from north-west to south-east) as far as the little fort of San Carlos; you will go up the Cassiquiare (from south to north), and then return to San Fernando in a month, descending the Upper Orinoco from east to west." Such was the plan traced for their passage, and they carried it into effect without danger, though not without some suffering, in the space of thirty-three days.

In their walks together the president of the mission gave the travellers an animated account of his incursions on the Rio Guaviare. He related to them how much these journeys, undertaken for the conquest of souls, were desired by the Indians of the missions. All, even women and old men, took part in them. Under the pretext of recovering neophytes who had deserted the village, children above eight or ten years of age were carried off, and distributed among the Indians of the missions as serfs.

Three years before the arrival of the travellers the missionary of San Fernando led his Indians to the banks of the Rio Guaviare, on one of those hostile in-

cursions. They found in an Indian hut a Guahiba woman with her three children, two of whom were still infants, occupied in preparing the flour of cassava. Resistance was impossible; the father was gone to fish, and the mother tried in vain to flee with her children. Scarcely had she reached the savannah when she was seized by the Indians of the mission. The mother and her children were bound, and dragged to the bank of the river. The monk, seated in his boat, waited the issue of an expedition of which he shared not the danger. Had the mother made too violent a resistance the Indians would have killed her, for everything was permitted for the sake of the conquest of souls, and it was particularly desirable to capture children, who might be treated in the mission as slaves of the Christians. The prisoners were carried to San Fernando, in the hope that the mother would be unable to find her way back to her home by land. Separated from her other children who had accompanied their father on the day in which she had been carried off, the unhappy woman showed signs of the deepest despair. She attempted to take back to her home the children who had been seized by the missionary; and she fled with them repeatedly from the village of San Fernando. But the Indians never failed to recapture her; and the missionary, after having caused her to be mercilessly beaten, took the cruel resolution of separating the mother from the two children who had been carried off with her. She was conveyed alone to the missions of the Rio Negro, going up the Atabapo. Slightly bound, she was seated at the bow of the boat, ignorant of the fate that awaited her; but she judged by the direction of the sun, that she was removing farther

and farther from her hut and her native country. She succeeded in breaking her bonds, threw herself into the water, and swam to the left bank of the Atabapo. The current carried her to a shelf of rock, which bears her name to this day—The Mother's Rock. She landed and took shelter in the woods, but the president of the missions ordered the Indians to row to the shore, and follow the traces of the Guahiba. In the evening she was brought back. Stretched upon the rock, a cruel punishment was inflicted upon her with straps of manati leather, which served for whips in that country, and with which the alcaldes were always furnished. The unhappy woman, her hands tied behind her back, was then dragged to the mission of Javita.

She was there thrown into one of the caravanserais. It was the rainy season, and the night was profoundly dark. Forests till then believed to be impenetrable separated the mission of Javita from that of San Fernando, which was twenty-five leagues distant in a straight line. No other route was known than that by the rivers; no man ever attempted to go by land from one village to another. But such difficulties could not deter a mother, separated from her children. The Guahiba was carelessly guarded in the caravanserai. Her arms being wounded, the Indians of Javita had loosened her bonds, unknown to the missionary and the alcaldes. Having succeeded by the help of her teeth in breaking them entirely, she disappeared during the night; and at the fourth sunrise was seen at the mission of San Fernando, hovering around the hut where her children were confined. "What that woman performed," added the missionary, who gave the travellers this sad narra-

tive, "the most robust Indian would not have ventured to undertake!" She traversed the woods when the sky was constantly covered with clouds, and the sun during the whole days appeared but for a few minutes. Did the course of the waters direct her way? The inundations of the rivers forced her to go far from the banks of the main stream, through the midst of woods where the movement of the water was almost imperceptible. How often must she have been stopped by the thorny lianas, that formed a network around the trunks they entwined! How often must she have swum across the rivulets that ran into the Atabapo! This unfortunate woman was asked how she had sustained herself during the four days. She said that, exhausted with fatigue, she could find no other nourishment than black ants. The travellers pressed the missionary to tell them whether the Guahiba had peacefully enjoyed the happiness of remaining with her children; and if any repentance had followed this excess of cruelty. He would not satisfy their curiosity; but at their return from the Rio Negro they learned that the Indian mother was again separated from her children, and sent to one of the missions of the Upper Orinoco. She there died, refusing all kind of nourishment.

Above the mouth of the Guasucari they entered the Rio Temi. The country exhibited the uniform aspect of forests covering ground perfectly flat. Wherever the river had formed caves the forest was inundated to the extent of more than half a league square. To avoid the sinuosities of the river and shorten the passage, the navigation was performed here in an extraordinary manner. The Indians made the travellers leave the bed of

the river; and they proceeded southward across the forest, through open channels of four or five feet broad. The depth of the water seldom exceeded half a fathom These channels were formed in the inundated forest like paths on dry ground. The Indians, in going from one mission to another, passed with their boats as much as possible by the same way; but the communications not being frequent the force of vegetation sometimes produced unexpected obstacles. An Indian, furnished with a machete, a great knife, the blade of which was fourteen inches long, stood at the head of their boat, employed continually in chopping off the branches that crossed each other from the two sides of the channel. In the thickest part of the forest they were astonished by an extraordinary noise. On beating the bushes, a shoal of fresh-water dolphins, four feet long, surrounded their boat. These animals had concealed themselves beneath the branches of a Bombax ceiba. They fled across the forest, throwing out those spouts of compressed air and water which have given them in every language the name of "blowers." How singular was this spectacle in an inland spot, three or four hundred leagues from the mouths of the Orinoco and the Amazon!

At five in the evening they regained with some difficulty the bed of the river. Their canoe remained fast for some time between two trunks of trees; and it was no sooner disengaged than they reached a spot where several small channels crossed each other, so that the pilot was puzzled to distinguish the most open path. They navigated through a forest so thick that they could guide themselves neither by the sun nor by the stars.

On the 1st of May the Indians chose to depart long

before sunrise. The travellers were stirring before them, however, because Humboldt waited, though vainly, for a star ready to pass the meridian. In those humid regions covered with forests, the nights became more obscure in proportion as they drew nearer to the Rio Negro and the interior of Brazil. They remained in the bed of the river till daybreak, being afraid of losing themselves among the trees. At sunrise they again entered the inundated forest, to avoid the force of the current. On reaching the junction of the Temi with another little river, the Tuamini, the waters of which were equally black, they proceeded along the latter to the south-west. This direction led them near the mission of Javita, which was founded on the banks of the Tuamini; and at this Christian settlement they were to find the aid necessary for transporting their canoe by land to the Rio Negro. They arrived at San Antonio de Javita shortly before noon.

They went every day to see how their canoe advanced on the portages. Twenty-three Indians were employed in dragging it by land, placing branches of trees to serve as rollers. The canoe being very large it was necessary to avoid with particular care any friction on the bottom; consequently the passage occupied more than four days. Hearing on the 5th that it had arrived, they set off and followed it on foot, fording a great number of streams which were considered dangerous on account of the vipers with which the marshes abounded. They passed the night in a hut lately abandoned by an Indian family, who had left behind them their fishing-tackle, pottery, nets made of the petioles of palm-trees; in short, all that composed the household furniture of that careless race of

men, little attached to property. A great store of resin was accumulated round the house. This was used by the Indians to pitch their canoes, and fix the bony spines of the ray at the points of their arrows. They found in the same place jars filled with a vegetable milk, which served as a varnish, and was celebrated in the missions by the name of "milk for painting." Before they took possession of the deserted hut, the Indians killed two great mapanare serpents. These serpents grow to four or five feet long. As the inside of the hut was filled with grass, and Humboldt and Bonpland were lying on the ground, there being no means of suspending their hammocks, they were not without inquietude during the night. In the morning a large viper was found on lifting the jaguar-skin upon which one of their domestics had slept.

They embarked on the Rio Negro on the 8th of May. Passing the mission of Maroa, and the mouths of the Aquio and the Tomo, they arrived at the little mission of San Miguel de Davipe. Here they bought provisions, among which were some fowls and a pig. This purchase greatly interested their Indians, who had been a long time deprived of meat. They pressed the travellers to depart in order to reach the island of Dapa, where the pig was to be killed and roasted during the night. They reached this island at sunset, and were surprised to find some cultivated ground on it, and on the top of a small hill an Indian hut. Four natives were seated round a fire of brushwood, in this hut, and they were eating a sort of white paste with black spots. These black spots proved to be large ants, the hinder parts of which resembled a lump of grease. They had been dried, and black-

ened by smoke. The travellers saw several bags of them suspended above the fire. These good people paid but little attention to their guests; yet there were more than fourteen persons in this confined hut, lying naked in hammocks hung one above another. When Father Zea arrived, he was received with great demonstrations of joy. Two young women came down from their hammocks, to prepare for them cakes of cassava. In answer to some inquiries which were put to them through an interpreter, they answered that cassava grew poorly on the island, but that it was a good land for ants, and food was not wanting. In fact, these ants furnished subsistence to the Indians of the Rio Negro and the Guainia. They did not eat the ants as a luxury, but because the fat of ants was a very substantial food. When the cakes of cassava were prepared, Father Zea, whose fever seemed rather to sharpen than to enfeeble his appetite, ordered a little bag to be brought to him filled with smoked ants. He mixed these bruised insects with flour of cassava, which he pressed Humboldt and Bonpland to taste. It somewhat resembled rancid butter mixed with crumb of bread. The cassava had not an acid taste, but some remains of European prejudices prevented their joining in the praises bestowed by the good missionary on what he called "an excellent ant paste."

The violence of the rain obliged them to sleep in this crowded hut. The Indians slept only from eight till two in the morning; the rest of the time they employd in conversing in their hammocks, and preparing their bitter beverage of cupana. They threw fresh fuel on the fire, and complained of cold, although the temperature of the air was at 70°. This custom of being awake, and even

on foot, four or five hours before sunrise, was general among the Indians of Guiana.

The travellers left the island of Dapa long before daybreak; and notwithstanding the rapidity of the current, and the activity of their rowers, their passage to the fort of San Carlos del Rio Negro occupied twelve hours.

They were informed at San Carlos that, on account of political circumstances, it was difficult at that moment to pass from the Spanish to the Portuguese settlements; but they did not know till after their return to Europe the extent of the danger to which they would have been exposed in proceeding as far as Barcellos. It was known at Brazil, through the medium of the newspapers, that Humboldt was going to visit the missions of the Rio Negro, and to examine the natural canal which united two great systems of rivers. In those desert forests instruments had been seen only in the hands of the commissioners of the boundaries; and at that time the subaltern agents of the Portuguese government could not conceive how a man of sense could expose himself to the fatigues of a long journey, "to measure lands that did not belong to him." Orders had been issued to seize his person, his instruments, and above all, his registers of astronomical observations. The pair of dangerous naturalists were to be conducted by way of the Amazon to Grand Para, and thence sent back to Lisbon. But fortunately for Humboldt, the government at Lisbon, on being informed of the zeal of its ignorant agents, instantly gave orders that he should not be disturbed in his operations; but that on the contrary they should be encouraged, if he traversed any part of the Portuguese possessions.

On the 10th of May, their canoe being ready, they embarked to go up the Rio Negro as far as the mouth of the Cassiquiare, and to devote themselves to researches on the real course of that river, which united the Orinoco to the Amazon. The morning was fine; but, in proportion as the heat augmented, the sky became obscured. The air was so saturated by water in these forests, that the vesicular vapours became visible on the least increase of evaporation at the surface of the earth. The breeze being never felt, the humid strata were not displaced and renewed by dryer air. The travellers were every day more grieved at the aspect of the cloudy sky. Bonpland was losing by this excessive humidity the plants he had collected; and Humboldt, for his part, was afraid lest he should again find the fogs of the Rio Negro in the valley of the Cassiquiare. No one in these missions for half a century past had doubted the existence of communication between two great systems of rivers; the important point of their voyage was confined therefore to fixing by astronomical observations the course of the Cassiquiare, and particularly the point of its entrance into the Rio Negro, and that of the bifurcation of the Orinoco. Without a sight of the sun and the stars this object would be frustrated, and they would have exposed themselves in vain to long and painful privations. Their fellow-travellers would have returned by the shortest way, that of the Pimichin and the small rivers; but Bonpland and Humboldt persisted in the plan of the voyage, which they had traced for themselves in passing the Great Cataracts. They had already travelled one hundred and eighty leagues in a boat from San Fernando de Apure to San Carlos, on the Rio Apure, the Orinoco, the Atabapo,

the Temi, the Tuamini, and the Rio Negro In again entering the Orinoco by the Cassiquiare they would have to navigate three hundred and twenty leagues, from San Carlos to Angostura. By this way they would have to struggle against the currents during ten days; the rest was to be performed by going down the stream of the Orinoco. It would have been blamable, they thought, to have suffered themselves to be discouraged by the fear of a cloudy sky, and by the mosquitos of the Cassiquiare. Their Indian pilot promised them the sun, and "those great stars that eat the clouds," as soon as they should have left the black waters of the Guaviare. They therefore carried out their first project of returning to San Fernando de Atabapo by the Cassiquiare; and, fortunately for their researches, the prediction of the Indian was verified. The white waters brought them by degrees a more serene sky, stars, mosquitos, and crocodiles.

They reached San Carlos again, and Humboldt passed a part of the night in the open air, waiting vainly for stars. The air was misty, notwithstanding the white waters, which were to lead them beneath an ever-starry sky.

They passed three nights at San Carlos, Humboldt watching during the greater part of them, in the hope of seizing the moment of the passage of some star over the meridian. That he might have nothing to reproach himself with, he kept his instruments always ready for an observation.

On the banks of the Cassiquiare he purchased from the Indians two fine large birds, a toucan, and a species of maçaw, seventeen inches long, having the whole body of a purple colour. He had already in his canoe

seven parrots, two manakins, a motmot, two guans, two manaviris, and eight monkeys. Father Zea whispered some complaints at the daily augmentation of this ambulatory collection. The toucan resembles the raven in manners and intelligence. It is a courageous bird, but easily tamed. Its long and stout beak serves to defend it at a distance. It makes itself master of the house, steals whatever it can come at, and loves to bathe often and fish on the banks of the river. The toucan that Humboldt bought was very young; yet it took delight, during the whole voyage, in teasing the nocturnal monkeys, which were melancholy and irritable.

Most of the animals were confined in small wicker cages; others ran at full liberty in all parts of the boat. At the approach of rain the macaws sent forth noisy cries, the toucan wanted to reach the shore to fish, and the little monkeys went in search of Father Zea, to take shelter in the large sleeves of his Franciscan habit. These incidents sometimes amused the travellers so much that they forgot the torment of the mosquitos. At night they placed a leather case containing their provisions in the centre; then their instruments, and the cages of their animals; their hammocks were suspended around the cages, and beyond were those of the Indians. The exterior circle was formed by the fires which were lighted to keep off the jaguars. Such was the order of their encampment on the banks of the Cassiquiare.

Among the Indians in their canoe was a fugitive from Guaisia, who had become sufficiently civilized in a few weeks to be useful to them in placing the instruments necessary for their observations at night. He was no less mild than intelligent, and they had some desire of taking

him into their service. What was their horror when, talking to him by means of an interpreter, they learned, that the flesh of the marimonde monkeys, though blacker, appeared to him to have the taste of human flesh. He told them that "his relations preferred the inside of the hands in man, as in bears." This assertion was accompanied with gestures of savage gratification. They inquired of this young man, so calm and so affectionate in the little services which he rendered them, whether he still felt sometimes a desire to eat of a Cheruvichahena. He answered, without discomposure, that, living in the mission, he would only eat what he saw was eaten by the Padres.

As they approached the bifurcation of the Orinoco their passage became troublesome, on account of the luxuriance of the vegetation. There was no longer a bank: a palisade of tufted trees formed the margin of the river. They saw a canal, one thousand two hundred feet broad, bordered by two enormous walls, clothed with lianas and foliage. They often tried to land, but without success. Towards sunset they sailed along for an hour seeking to discover, not an opening, since none existed, but a spot less wooded, where their Indians by means of the hatchet and manual labour, could clear space enough for a resting-place for twelve or thirteen persons. It was impossible to pass the night in the canoe; the mosquitos, which tormented them during the day, accumulated towards evening beneath the roof covered with palm-leaves, which served to shelter them from the rain. Their hands and faces had never before been so much swelled. Father Zea, who had till then boasted of having in his missions of the cataracts

the largest and fiercest mosquitos, at length gradually acknowledged that the sting of the insects of the Cassiquiare was the most painful he had ever felt. They experienced great difficulty, amid a thick forest, in finding wood to make a fire, the branches of the trees being so full of sap that they would scarcely burn. There being no bare shore, it was hardly possible to procure old wood, which the Indians called *wood baked in the sun.* However, fire was necessary to them only as a defence against the beasts of the forest; for they had such a scarcity of provision that they had little need of fuel for the purpose of preparing their food.

On the 18th of May, towards evening, they discovered a spot where wild cocoa-trees were growing on the bank of the river. It rained violently, but the pothoses, arums, and lianas, furnished so thick a natural trellis, that they were sheltered as under a vault of foliage. The Indians, whose hammocks were placed on the edge of the river, interwove the heliconias, so as to form a kind of roof over them. Their fires lighted up, to the height of fifty or sixty feet, the palm-trees, the lianas loaded with flowers, and the columns of white smoke, which ascended in a straight line towards the sky.

They passed the night of the 20th, the last of their passage on the Cassiquiare, near the point of the bifurcation of the Orinoco. They had some hope of being able to make an astronomical observation, as falling-stars of remarkable magnitude were visible through the vapours that veiled the sky; whence they concluded that the stratum of vapours must be very thin, since meteors of this kind were scarcely ever seen below a cloud. Those they now beheld shot towards the north, and succeeded each

other at almost equal intervals. The Indians, who seldom ennobled by their expressions the wanderings of the imagination, named the falling-stars the urine, and the dew the spittle of the stars. The clouds thickened anew, and the travellers discerned neither the meteors, nor the real stars, for which they had waited during several days.

They had been told that they should find the insects at Esmeralda still more cruel and voracious, than in the branch of the Orinoco which they were going up; nevertheless they indulged the hope of at length sleeping in a spot that was inhabited, and of taking some exercise in herbalizing. This anticipation was, however, disturbed at their last resting-place on the Cassiquiare. Whilst they were sleeping on the edge of the forest, they were warned by the Indians, in the middle of the night, that they heard very near the cries of a jaguar. These cries, they alleged, came from the top of some neighbouring trees.

As their fires burnt brightly, the travellers paid little attention to the cries of the jaguars, who had been attracted by the smell and noise of their dog. This animal began at first to bark; and when the jaguars drew nearer, to howl, hiding himself below the hammocks of the travellers. Great was their grief, when in the morning, at the moment of re-embarking, the Indians informed them that the dog had disappeared! There could be no doubt that he had been carried off by the jaguars. Perhaps, when their cries had ceased he had wandered from the fires on the side of the beach. They waited part of the morning, in the hope that the dog had only strayed. Three days after they came back to the same place; they heard again the cries of the jaguars,

but all their search was in vain. The dog, which had accompanied them from Caracas, and had so often in swimming escaped the pursuit of the crocodiles, had been devoured in the forest.

On the 21st they again entered the bed of the Orinoco, three leagues below the mission of Esmeralda. It was now a month since they had left that river near the mouth of the Guaviare. They had still to proceed seven hundred and fifty leagues before reaching Angostura.

At Esmeralda they were cordially received by an old officer, who took them for Catalonian shopkeepers, and who supposed that trade had led them to the missions. On seeing packages of paper intended for drying their plants, he smiled at their simple ignorance. "You come," said he, "to a country where this kind of merchandise has no sale; we write little here; and the dried leaves of maize, the plantain-tree, and the heliconia serve us, like paper in Europe, to wrap up needles, fish-hooks, and other little articles of which we are careful." This old officer united in his person the civil and ecclesiastical authority. He taught the children the Rosary; he rang the bells to amuse himself; and impelled by ardent zeal for the service of the church, he sometimes used his chorister's wand in a manner not very agreeable to the natives.

When they arrived at Esmeralda, the greater part of the Indians were returning from an excursion which they had made to the east, beyond the Rio Padamo, to gather brazil nuts. Their return was celebrated by a festival, which was called in the mission the festival of brazil nuts, and which resembled the harvest-homes and vintage-feasts of Germany. The women had prepared a

quantity of fermented liquor, and during two days the Indians were in a state of intoxication. The harvest was celebrated by dancing and drinking. The hut where the natives were assembled, displayed during several days a singular aspect. There was neither table nor bench; but large roasted monkeys, blackened by smoke, were ranged in regular order against the wall. The manner of roasting these animals contributed to render their appearance extremely disagreeable in the eyes of the travellers. A little grating or lattice of very hard wood was formed, and raised one foot from the ground. The monkey was skinned, and bent into a sitting posture; the head generally resting on the arms, which were meagre and long. When it was tied on the grating, a very clear fire was kindled below. The monkey, enveloped in smoke and flame, was broiled and blackened at the same time. On seeing the natives devour the arm or leg of a roasted monkey, it was difficult not to believe that this habit of eating animals so closely resembling man in their physical organization, had, to a certain degree, contributed to diminish the horror of cannibalism among these people. The flesh of monkeys is so lean and dry, that Bonpland preserved in his collections at Paris an arm and hand, which had been broiled over the fire at Esmeralda; and no smell rose from them after the lapse of a number of years.

The travellers saw the Indians dance. The monotony of their dancing was increased by the women not daring to take part in it. The men, young and old, formed a circle, holding each other's hands, and turned sometimes to the right, sometimes to the left, for whole hours, with silent gravity. Most frequently the dancers themselves

were the musicians. Feeble sounds, drawn from a series of reeds of different lengths, formed a slow and plaintive accompaniment. The first dancer, to mark the time, bent both knees in a kind of cadence. Sometimes they all made a pause in their places, and executed little oscillatory movements, bending the body from one side to the other. When they were weary of dancing the women brought them roasted monkeys and palm cabbage, not forgetting their native liquors, which were strong and heady.

Leaving Esmeralda on the afternoon of the 23d the travellers reached the bifurcation of the Orinoco, where they remained that night. Descending the river the next morning they passed the mouths of the Rio Cunucunumo, and the Guanami, and Puriname. Between the sources of the Rio Blanco, and the Rio Essequibo, they met with rocks and symbolical figures. They were also shown, near the Culimacari, on the banks of the Cassiquiare, traces which were believed to be regular characters. They were however only misshapen figures, representing the heavenly bodies, together with tigers, crocodiles, boas, and instruments used for making the flour of cassava. It was impossible to recognise in these painted rocks any symmetrical arrangement, or characters with regular spaces.

The travellers stopped at the village of Santa Barbara on the evening of the 25th. During the whole of the next day they enjoyed the view of the fine mountains of Sipapo, which rose at a distance of more than eighteen leagues in the direction of north-north-west. The vegetation of the banks of the Orinoco was singularly varied in this part of the country; the arborescent ferns de-

scended from the mountains, and mingled with the palm-trees of the plain. They rested that night on the island of Minisi; and, after having passed the mouths of the little rivers Quejanuma, Ubua, and Masao, arrived, on the 27th, at San Fernando de Atabapo. They lodged in the same house which they had occupied a month previously, when going up the Rio Negro. Then they directed their course towards the south, by the Atabapo and the Temi; they were now returning from the west, having made a long circuit by the Cassiquiare and the Upper Orinoco.

Quitting San Fernando on the 27th, they arrived, by help of the rapid current of the Orinoco, in seven hours, at the mouth of the Rio Mataveni. They passed the night in the open air, under the granitic rock El Castillito, which rose in the middle of the river, the form of which reminded Humboldt of the ruin called the Mouse-tower, opposite Bingen.

"Fair Bingen on the Rhine."

On the evening of the 31st they landed just before sunset on the eastern bank of the Orinoco in order tc visit the cavern of Ataruipe, the sepulchre of a destroyed nation.

They climbed with difficulty, and not without some danger, a steep rock of granite, entirely bare. It would have been almost impossible for them tò have fixed their feet on its smooth and sloping surface, but for large crystals of feldspar, resisting decomposition, which stood out from the rock, and furnished points of support. Scarcely had they attained the summit of the mountain when they

beheld the singular aspect of the surrounding country. The foamy bed of the waters was filled with an archipelago of islands covered with palm-trees. Westward, on the left bank of the Orinoco, the wide-stretching savannahs of the Meta and the Casanare resembled a sea of verdure. The setting sun seemed like a globe of fire suspended over the plain, and the solitary peak of Uniana, which appeared more lofty from being wrapped in vapours which softened its outline, all contributed to deepen the majesty of the scene. Immediately below them lay a deep valley, inclosed on every side. Birds of prey and goatsuckers winged their lonely flight in this inaccessible place. The travellers found a pleasure in following with the eye their fleeting shadows, as they glided slowly over the flanks of the rock.

The most remote part of the valley was covered by a thick forest. In this shady and solitary spot, on the declivity of a steep mountain, the cavern of Ataruipe opened to the view. It was less a cavern than a jutting rock, in which the waters had scooped a vast hollow when, in the ancient revolutions of our planet, they attained that height. In this tomb of an extinct tribe the travellers counted nearly six hundred skeletons well preserved, and regularly placed. Every skeleton reposed in a sort of basket made of the petioles of the palm-tree. These baskets had the form of a square bag. Their size was proportioned to the age of the dead; there were some for infants cut off at the moment of their birth. The travellers saw them from ten inches to three feet four inches long, the skeletons in them being bent together. They were all ranged near each other, and were so entire that not a rib or a phalanx was wanting. The bones had been

prepared in three different manners, either whitened in the air and the sun, dyed red with anoto, or like mummies, varnished with odoriferous resins, and enveloped in leaves of the heliconia, or the plantain-tree. The Indians informed them that the fresh corpse was placed in damp ground, that the flesh might be consumed by degrees; some months afterwards it was taken out, and the flesh remaining on the bones was scraped off with sharp stones. Earthen vases half-baked were found near the baskets. They appeared to contain the bones of the same family. The largest of these vases, or funeral urns, were five feet high, and three feet three inches long. Their colour was greenish-grey, and their oval form was pleasing to the eye. The handles were made in the shape of crocodiles or serpents; the edges were bordered with painted meanders, labyrinths, and grecques, in rows variously combined. Such designs are found in every zone among nations the farthest removed from each other, either with respect to their respective positions on the globe, or to the degree of civilization which they have attained. They still adorn the common pottery made by the inhabitants of the little mission of Maypures; they ornament the bucklers of the Otaheitans, the fishing-implements of the Esquimaux, the walls of the Mexican palace of Mitla, and the vases of ancient Greece.

They could not acquire any precise idea of the period to which the origin of the baskets and the painted vases, contained in the bone-cavern of Ataruipe, could be traced. A tradition circulated among the Guahibos, that the warlike Atures, pursued by the Caribs, escaped to the rocks that rose in the middle of the Great Cataracts; and there that nation became gradually extinct, as well as its lan-

guage. The last families of the Atures still existed in 1767, in the time of the missionary Gili. At the period of Humboldt's voyage an old parrot was shown at Maypures, of which the inhabitants said, that "they did not understand what it said, because it spoke the language of the Atures."

The travellers opened, to the great concern of their guides, several baskets, for the purpose of examining attentively the form of the skulls. They were all marked by the characteristics of the American race, with the exception of two or three, which approached to the Caucasian. In the middle of the Cataracts, in the most inaccessible spots, cases were found strengthened with iron bands, and filled with European tools, vestiges of clothes, and glass trinkets. These articles, which had given rise to the most absurd reports of treasures hidden by the Jesuits, probably belonged to Portuguese traders who had penetrated into these savage countries.

Humboldt and Bonpland took several skulls, the skeleton of a child of six or seven years old, and two full-grown men of the nation of the Atures, from the cavern of Ataruipe. All these bones, partly painted red, partly varnished with odoriferous resins, were placed in the baskets which we have just described. They made almost the whole load of a mule; and as the travellers knew the superstitious feelings of the Indians in reference to the remains of the dead after burial, they carefully enveloped the baskets in mats recently woven. Unfortunately for them, the penetration of the Indians, and the extreme quickness of their sense of smelling, rendered all these precautions useless. Wherever they stopped, in the missions of the Caribees, amid the Llanos

between Angostura and Nueva Barcelona, the natives assembled round their mules to admire the monkeys which they had purchased at the Orinoco. These good people had scarcely touched their baggage, when they announced the approaching death of the beast of burden that carried the dead. In vain the travellers told them they were deceived in their conjectures; and that the baskets contained the bones of crocodiles and manatis; they persisted in repeating that they smelt the resin that surrounded the skeletons, and "that they were their old relations." The travellers were obliged to request that the monks would interpose their authority, to overcome the aversion of the natives, and procure for them a change of mules.

They withdrew in silence from the cavern of Ataruipe. It was one of those calm and serene nights which are so common in the torrid zone. The stars shone with a mild and planetary light. Their scintillation was scarcely sensible at the horizon, which seemed illumined by the great nebulæ of the southern hemisphere. An innumerable multitude of insects spread a reddish light upon the ground, loaded with plants, and resplendent with these living and moving fires, as if the stars of the firmament had sunk down on the savannah. On quitting the cavern the travellers stopped to admire the beauty of this singular scene. The odoriferous vanilla and festoons of bignonia decorated the entrance; and above, on the summit of the hill, the arrowy branches of the palm-trees waved murmuring in the air. They descended towards the river, to take the road to the mission, where they arrived late in the night.

Thev stayed at the mission of Atures only during the

time necessary for passing the canoe through the Great Cataract. The bottom of their frail bark had become so thin that it required great care to prevent it from splitting. They took leave of the missionary, Bernardo Zea, who remained at Atures, after having accompanied them during two months, and shared all their sufferings. This poor monk still continued to have fits of tertian ague; they had become to him an habitual evil, to which he paid little attention. Other fevers of a more fatal kind prevailed at Atures on their second visit. The greater part of the Indians could not leave their hammocks, and the travellers were obliged to send in search of cassava-bread, the most indispensable food of the country, to the independent but neighbouring tribe of the Piraoas.

The travellers passed in their canoe through the latter half of the Cataract of Atures. They landed here and there, to climb upon the rocks, which like narrow dikes joined the islands one to another. Sometimes the waters forced their way over the dikes, sometimes they fell within them with a hollow noise. A considerable portion of the Orinoco was dry, because the river had found an issue by subterraneous caverns. In these solitary haunts the rock-manakin with gilded plumage, one of the most beautiful birds of the tropics, built its nest. The little Cataract of Carucari was caused by an accumulation of enormous blocks of granite, several of which were spheroids of five or six feet in diameter, and they were piled together in such a manner, as to form spacious caverns. The travellers entered one of these caverns to gather the confervæ that were spread over the clefts and humid sides of the rock. This spot displayed one of the most extraordinary scenes of nature, that they had con-

templated on the banks of the Orinoco. The river rolled its waters turbulently over their heads. It seemed like the sea dashing against reefs of rocks; but at the entrance of the cavern they could remain dry beneath a large sheet of water that precipitated itself in an arch from above the barrier. In other cavities, deeper, but less spacious, the rock was pierced by the effect of successive filtrations. They saw columns of water, eight or nine inches broad, descending from the top of the vault, and finding an issue by clefts, that seemed to communicate at great distances with each other.

They had the opportunity of examining this extraordinary sight longer than they wished. Their boat was to coast the eastern bank of a narrow island, and to take them in again after a long circuit. They passed an hour and a half in vain expectation of it. Night approached, and with it a tremendous storm. It rained with violence. They began to fear that their frail bark had been wrecked against the rocks, and that the Indians, conformably to their habitual indifference for the evils of others, had returned tranquilly to the mission. There were only three of the party; they were completely wet, and uneasy respecting the fate of their boat: it appeared far from agreeable to pass, without sleep, a long night of the torrid zone, amid the noise of the cataracts. Bonpland proposed to leave Humboldt on the island, and to swim across the branches of the river, that were separated by the granitic dikes. He hoped to reach the forest, and seek assistance at Atures from Father Zea. They dissuaded him with difficulty from undertaking this hazardous enterprise. The little monkeys which they had carried along with them for months, were deposited

on the point of the island. Wet by the rains, and sensible of the least lowering of the temperature, these delicate animals sent forth plaintive cries, and attracted to the spot two crocodiles, the size and leaden colour of which denoted their great age. After long waiting, the Indians at length arrived at the close of day. The natural coffer-dam, by which they had endeavoured to descend, in order to make the circuit of the island, had become impassable, owing to the shallowness of the water. The pilot sought long for a more accessible passage in this labyrinth of rocks and islands. Happily the canoe was not damaged, and in less than half an hour the instruments, provision, and animals, were embarked.

They stopped a few days after at the mission of Uruana. The situation of this mission was extremely picturesque. The little Indian village stood at the foot of a lofty granitic mountain. Rocks everywhere appeared in the form of pillars above the forest, rising higher than the tops of the tallest trees. The aspect of the Orinoco was nowhere more majestic, than when viewed from the hut of the missionary, Fray Ramon Bueno. It was more than fifteen thousand six hundred feet broad, and it ran without any winding, like a vast canal, straight towards the east. Two long and narrow islands contributed to give extent to the bed of the river. The mission was inhabited by the Ottomacs, a tribe in the rudest state, and presenting one of the most extraordinary physiological phenomena. They ate earth; that is, they swallowed every day, during several months, very considerable quantities, to appease hunger, and this practice did not appear to have any injurious effect on their health.

Though the travellers could stay only one day at Uruana, this short space of time sufficed to make them acquainted with the preparation of the balls of earth. Humboldt also found some traces of this vitiated appetite among the Guamos; and between the confluence of the Meta and the Apure, where everybody spoke of dirt-eating as of a thing anciently known.

The inhabitants of Uruana belonged to those nations of the savannahs called wandering Indians, who, more difficult to civilize than the nations of the forest, had a decided aversion to cultivating the land, and lived almost exclusively by hunting and fishing. They were men of very robust constitution; but ill-looking, savage, vindictive, and passionately fond of fermented liquors. They were omnivorous animals in the highest degree; and therefore the other Indians, who considered them as barbarians, had a common saying, "nothing is so loathsome but that an Ottomac will eat it." While the waters of the Orinoco and its tributary streams were low, the Ottomacs subsisted on fish and turtles. The former they killed with surprising dexterity, by shooting them with arrows when they appeared at the surface of the water. When the rivers swelled fishing almost entirely ceased. It was then very difficult to procure fish, which often failed the poor missionaries, on fast-days as well as flesh-days, though all the young Indians were under the obligation of fishing for the convent. During the period of these inundations, which lasted two or three months, the Ottomacs swallowed a prodigious quantity of earth. The travellers found heaps of earth-balls in their huts, piled up in pyramids three or four feet high. These balls were five or six inches in diameter. The earth which

the Ottomacs ate was a very fine and unctuous clay, of a yellowish grey colour; when it was slightly baked at the fire, the hardened crust had a tint inclining to red, owing to the oxide of iron which was mingled with it. The travellers brought away some of this earth, which they took from the winter-provision of the Indians.

They reached Angostura on the 13th of June. In seventy-five days they had performed a passage of five hundred leagues on the five great rivers, Apure, Orinoco, Atabapo, Rio Negro, and Cassiquiare; and in this vast extent they had found but a very small number of inhabited places. After the life they had led in the woods, their dress was not in the very best order, nevertheless they hastened to present themselves to Don Felipe de Ynciarte, the governor of the province of Guiana. He received them in the most cordial manner, and lodged them in the house of the secretary of the Intendencia. Coming from an almost desert country, they were struck with the bustle of the town, though it contained only six thousand inhabitants. They admired the conveniences which industry and commerce furnish to civilized man. Humble dwellings appeared to them magnificent; and every person with whom they conversed, seemed to be endowed with superior intelligence. Long privations give a value to the smallest enjoyments; and Humboldt could not express the pleasure he felt, when he saw for the first time wheaten bread on the governor's table.

They felt themselves on the first days after their arrival tired and enfeebled, but in perfect health. Bonpland began to examine the small number of plants which he had been able to save from the influence of the damp climate; and Humboldt was occupied in settling by

astronomical observations the longitude and latitude of the capital, as well as the dip of the magnetic needle. These labours were soon interrupted. They were both attacked almost on the same day by a disorder, which with Bonpland took the character of a debilitating fever. At this period the air was in a state of the greatest salubrity at Angostura; and as the only mulatto servant they had brought from Cumana felt symptoms of the same disorder, it was suspected that they had imbibed the germs of typhus in the damp forests of Cassiquiare. Their mulatto servant having been much more exposed to the rains than they were, his disorder increased with frightful rapidity. His prostration of strength was excessive, and on the ninth day his death was announced to them. He was however only in a state of swooning, which lasted several hours, and was followed by a salutary crisis. Humboldt was attacked at the same time with a violent fit of fever, during which he was made to take a mixture of honey and bark, a remedy much extolled in the country by the Capuchin missionaries. The intensity of the fever increased, but it left him on the following day. Bonpland remained in a very alarming state, which during several weeks caused them the most serious inquietude. Fortunately he preserved sufficient self-possession to prescribe for himself. The fever was continual; and, as almost always happens within the tropics, it was accompanied by dysentery. Bonpland displayed that courage and mildness of character which never forsook him in the most trying situations. Humboldt was agitated by sad presages; for he remembered that the botanist Loefling, a pupil of Linneus, died not far from Angostura, near the banks of the Carony, a

victim of his zeal for the progress of natural history. They had not yet passed a year in the torrid zone; and Humboldt's faithful memory conjured up everything he had read in Europe on the dangers of the atmosphere inhaled in the forests. Instead of going up the Orinoco, they might have sojourned some months in the temperate and salubrious climate of the Sierra Nevada de Merida. "It was I," he thought, "who chose the path of the rivers, and Bonpland's death, if he dies, will be laid at my door."

CHAPTER V.

TO CUBA AND BACK.

THE travellers left Angostura on the 10th of July. Night had set in when they crossed for the last time the bed of the Orinoco. They purposed to rest near the little fort San Rafael, and on the following morning at daybreak to set out on their journey through the plains of Venezuela. About a month had elapsed since their arrival at Angostura; and they earnestly wished to reach the coast, with the view of finding, at Cumana, or at Nueva Barcelona, a vessel in which they might embark for the island of Cuba, thence to proceed to Mexico. After the sufferings to which they had been exposed during several months, whilst sailing in small boats on rivers infested by mosquitos, the idea of a sea-voyage was not without its charms. They had no idea of ever again returning to South America. Sacrificing the Andes of Peru to the Archipelago of the Philippines, they adhered to their old plan of remaining a year in Mexico, then proceeding in a galleon from Acapulco to Manilla, and returning to Europe by way of Bassora and Aleppo.

Their mules were in waiting for them on the left bank of the Orinoco. The collection of plants, and the different geological series, which they had brought from the

Esmeralda and Rio Negro, had greatly increased their baggage; and, as it would have been dangerous to lose sight of their herbals, they expected to make a very slow journey across the Llanos.

On the 13th they arrived at the village of Cari, the first of the Caribbee missions. They lodged as usual at the convent. Their host could scarcely comprehend "how natives of the north of Europe could arrive at his dwelling from the frontiers of Brazil by the Rio Negro, and not by way of the coast of Cumana." He treated them in the most poilte manner, at the same time manifesting that somewhat importunate curiosity which the appearance of a stranger, not a Spaniard, always excited in South America. He expressed his belief that the minerals they had collected must contain gold; and that the plants, dried with so much care, must be medicinal. Here, as in many parts of Europe, the sciences were thought worthy to occupy the mind only so far as they conferred some immediate and practical benefit on society.

The travellers found more than five hundred Caribs in the village of Cari; and saw many others in the surrounding missions. They were a very tall race of men, their height being from five feet six, to five feet ten inches. According to a practice common in America, the women were more sparingly clothed than the men. The former wore only the *guajuco*, in the form of a band. The men had the lower part of the body wrapped in a piece of blue cloth, so dark as to be almost black. This drapery was so ample, that, on the lowering of the temperature towards evening, the Caribs threw it over their shoulders. The men cut their hair in a peculiar manner,

very much in the style of the monks. A part of the forehead was shaved, which made it appear extremely high, and a circular tuft of hair was left near the crown of the head. The Carib women were less robust and good-looking than the men. On them devolved almost the whole burden of domestic work, as well as much of the out-door labour. They asked the travellers eagerly for pins, which they stuck under their lower lip, making the head of the pin penetrate deeply into the skin. The young girls were painted red, and were almost naked.

On quitting the mission of Cari, they had some difficulties to settle with their Indian muleteers. They had discovered that the travellers had brought skeletons with them from the cavern of Ataruipe; and they were fully persuaded that the beasts of burden which carried the bodies of their old relations would perish on the journey. Every precaution the travellers had taken was useless; nothing could escape a Carib's penetration and keen sense of smell, and it required all the authority of the missionary to forward their passage. They had to cross the Rio Cari in a boat, and the Rio de Agua Clara, by fording, or, it may almost be said, by swimming. They had two bad stations, one at Matagorda and the other at Los Riecetos, before they reached the little town of Pao They beheld everywhere the same objects; small huts constructed of reeds, and roofed with leather; men on horseback armed with lances, guarding the herds; herds of cattle half wild, remarkable for their uniform colour, and disputing the pasturage with horses and mules.

The travellers arrived, on the 23rd, at the town of Nueva Barcelona, less fatigued by the heat of the Llanos, to which they had been long accustomed, than annoyed

by the winds of sand, which occasioned painful chaps in the skin.

The climate of Barcelona was not so hot as that of Cumana, but it was extremely damp, and somewhat unhealthy in the rainy season. Bonpland had borne very well the irksome journey across the Llanos, and had recovered his strength and activity; but Humboldt suffered more at Barcelona than at Angostura, immediately after their passage on the rivers. They remained nearly a month at Barcelona, where they found their friend Fray Juan Gonzales, who had traversed the Upper Orinoco before them. He expressed regret that they had not been able to prolong their visit to that unknown country; and he examined their plants and animals with that interest which must be felt by even the most uninformed man for the productions of a region he has long since visited. Fray Juan had resolved to go to Europe, and to accompany them as far as the island of Cuba. They were together for the space of seven months, and they found his society agreeable: he was cheerful, intelligent, and obliging. Little did they anticipate the sad fate that awaited him. He took charge of a part of their collections; and a friend of his own confided to his care a child, who was to be conveyed to Spain for its education. Alas! the collection, the child, and the young ecclesiastic, were all buried in the waves.

The packet boats from Corunna bound for Havanna and Mexico had been due three months; and it was believed they had been taken by the English cruisers stationed on this coast. Anxious to reach Cumana, in order to avail themselves of the first opportunity that might offer for their passage to Vera Cruz, the travel-

lers hired an open boat called a lancha, a sort of craft employed habitually in the latitudes east of Cape Codera, where the sea was scarcely ever rough. Their lancha, which was laden with cocoa, carried on a contraband trade with the island of Trinidad. For this reason the owner imagined they had nothing to fear from the enemy's vessels, which then blockaded all the Spanish ports. They embarked their collection of plants, their instruments, and their monkeys; and, the weather being delightful, they hoped to make a very short passage from the mouth of the Rio Neveri to Cumana. But they had scarcely reached the narrow channel between the continent and the rocky isles of Borracha and the Chimanas, when to their great surprise they came in sight of an armed boat, which, whilst hailing them from a great distance, fired some musket-shot at them. The boat belonged to a privateer of Halifax. The protestations of the travellers were without effect; they were carried on board the privateer, and the captain, affecting not to recognise the passports delivered by the governor of Trinidad for the illicit trade, declared them to be a lawful prize. Being a little in the habit of speaking English, Humboldt entered into conversation with the captain, begging not to be taken to Nova Scotia, but to be put on shore on the neighbouring coast. While he endeavoured, in the cabin, to defend his own rights, and those of the owner of the lancha, he heard a noise on deck. Something was whispered to the captain, who left in consternation. Happily for them an English sloop of war, the Hawk, was cruising in those parts, and had signalled the captain to bring to; but the signal not being promptly answered, a gun was fired from the sloop,

and a midshipman sent on board the vessel. He gave Humboldt hopes, that the lancha, which was laden with cocoa, would be given up, and that on the following day they might pursue their voyage. In the meantime he invited the traveller to accompany him on board the sloop, assuring him that his commander, Captain Garnier, would furnish him with better accommodation for the night, than he would find in the vessel from Halifax.

Humboldt accepted these obliging offers, and was received with the utmost kindness by Captain Garnier, who had made the voyage to the north-west coast of America with Vancouver, and who appeared to be highly interested in all he related to him respecting the great cataracts of Atures and Maypures, the bifurcation of the Orinoco, and its communication with the Amazon. He introduced to him several of his officers, who had been with Lord Macartney in China. Humboldt had not, during the space of a year, enjoyed the society of so many well-informed persons. They had learned from the English newspapers the object of his enterprise. He was treated with great confidence, and the commander gave him up his own state-room.

The travellers continued their passage the next day, and were surprised at the depth of the channels between the Caracas Islands, where the sloop worked her way through them almost touching the rocks. Numbers of pelicans, and of flamingoes, which fished in the nooks, or harassed the pelicans in order to seize their prey, indicated their approach to the coast of Cumana. At sunrise the sea-birds suddenly appeared, and animated the scene, reminding the travellers, in these solitary regions, of the activity of the cities of Europe at the

dawn of day. At nine in the morning they reached the gulf of Cariaco, which served as a roadstead to the town of Cumana. The hill, crowned by the castle of San Antonio, stood out, prominent from its whiteness, on the dark curtain of the inland mountains. They gazed with interest on the shore, where they first gathered plants in America, and where, some months later, Bonpland had been in such danger. Among the cactuses that rose in columns twenty feet high appeared the Indian huts of the Guayquerias. Their friends at Cumana came out to meet them: men of all castes, with whom their frequent herborizations had brought them in contact, expressed the greater joy at sight of them, as a report that they had perished on the banks of the Orinoco had been current for several months.

The travellers hastened to visit Don Vicente Emparan, whose recommendations and constant solicitude had been so useful to them during the long journey they had just terminated. He procured for them, in the centre of the town, a house which was extremely useful for their instruments. They enjoyed from its terraces a majestic view of the sea, of the isthmus of Araya, and the archipelago of the islands of Caracas, Picuita, and Borracha. The port of Cumana was every day more and more blockaded, and the vain expectation of the arrival of Spanish packets detained them two months and a half longer. They were often nearly tempted to go to the Danish islands, which enjoyed a happy neutrality; but they feared that, if they left the Spanish colonies, they might find some obstacles to their return. They employed their time in completing the Flora of Cumana, geologically examining the eastern part of the peninsula

of Araya, and observing many eclipses of satellites, which confirmed the longitude of the place already obtained by other means. They also made experiments on the extraordinary refractions, on evaporation, and on atmospheric electricity.

They prolonged their stay at Cumana a fortnight. Having lost all hope of the arrival of a packet from Corunna, they availed themselves of an American vessel, laden at Nueva Barcelona with salt provision for the island of Cuba. They had now passed sixteen months on this coast, and in the interior of Venezuela, and on the 16th of November they parted from their friends at Cumana to make the passage for the third time across the gulf of Cariaco to Nueva Barcelona. The night was cool and delicious. It was not without emotion that they beheld for the last time the disc of the moon illuminating the summit of the cocoa-trees that surrounded the banks of the Manzanares. The breeze was strong, and in less than six hours they anchored near the Morro of Nueva Barcelona, where the vessel which was to take them to Havanna was ready to sail.

They sailed from Nueva Barcelona on the 24th. On the 2d of December they descried Cape Beata. During the night there was a very curious optical phenomenon, which Humboldt could not account for. At half-past twelve the wind blew feebly from the east; the thermometer rose to 74°. Humboldt had remained upon the deck to observe the culmination of some stars. The full moon was high in the heavens. Suddenly, in the direction of the moon, 45° before its passage over the meridian, a great arch was formed tinged with the prismatic colours, though not of a bright hue. The arch

appeared higher than the moon; this iris-band was near 2° broad, and its summit seemed to rise nearly from 80° to 85° above the horizon of the sea. The sky was singularly pure; there was no appearance of rain; and what struck him most was, that this phenomenon, which perfectly resembled a lunar rainbow, was not in the direction opposite to the moon. The arch remained stationary, or at least appeared to do so, during eight or ten minutes; and at the moment when he tried if it were possible to see it by reflection in the mirror of the sextant, it began to move and descend, crossing successively the moon and Jupiter. It lacked six minutes of one o'clock when the summit of the arch sank below the horizon. This movement of an arch, coloured like the rainbow, filled with astonishment the sailors who were on watch on the deck. They alleged, as they did on the appearance of every extraordinary meteor, that it denoted wind.

The travellers anchored at Havanna on the 19th of December. Not being able to find a passage in any neutral vessel, Humboldt freighted a Catalonian sloop, lying at Batabano, which was to be at his disposal to take him either to Porto Bello or Carthagena, according as the gales of Saint Martha should permit.

The travellers set sail on the 9th of March, somewhat incommoded by the smallness of their vessel, which afforded no sleeping place but upon deck. The cabin received no air or light but from above; it was merely a hold for provisions, and it was with difficulty that they could place their instruments in it.

They were soon in the gulf of Batabano, which was bounded by a low and marshy coast, and looked like a vast desert. The fishing birds, which were generally at

their post whilst the small birds and the indolent vultures were at roost, were seen only in small numbers. The sea was of a greenish-brown hue, as in some of the lakes of Switzerland; while the air, owing to its extreme purity, had, at the moment the sun appeared above the horizon, a cold tint of pale blue, similar to that which landscape painters observe at the same hour in the south of Italy, and which makes distant objects stand out in strong relief. They sailed E.S.E., taking the passage of Don Cristoval, to reach the rocky island of Cayo de Piedras, and to clear the archipelago, which the Spanish pilots, in the early times of the conquest, designated by the names of Gardens and Bowers. The Queen's Gardens, properly so called, were nearer Cape Cruz, and were separated from the archipelago by an open sea thirty-five leagues broad. Columbus gave them the name they bear, in 1494, when, on his second voyage, he struggled during fifty-eight days with the winds and currents between the island of Pinos and the eastern cape of Cuba. He describes the islands of this archipelago as verdant, full of trees and pleasant.

A part of these so-styled gardens was indeed beautiful; the voyagers saw the scene change every moment, and the verdure of some of the islands appeared the more lovely from its contrast with chains of rocks, displaying only white and barren sands. The surface of these sands, heated by the rays of the sun, seemed to be undulating like the surface of a liquid. The contact of layers of air of unequal temperature, produced the most varied phenomena of suspension and mirage, from ten in the morning till four in the afternoon. Even in these desert places the sun animated the landscape, and gave mobility to the

sandy plain, to the trunks of trees, and to the rocks that projected into the sea like promontories. When the sun appeared these inert masses seemed suspended in air; and on the neighbouring beach, the sands presented the appearance of a sheet of water gently agitated by the winds. A train of clouds sufficed to seat the trunks of trees and the suspended rocks again on the soil; to render the undulating surface of the plains motionless; and to dissipate the charm which the Arabian, Persian, and Hindoo poets have celebrated as

"The sweet illusions of the lonely desert."

They doubled Cape Matahambre very slowly. Humboldt determined, "as they sailed, as they sailed," the positions of Cayo de Don Cristoval, Cayo Flamenco, Cayo de Diego Perez, and Cayo de Piedras. He also employed himself in examining the influence which the changes at the bottom of the sea produce on its temperature at the surface.

Nothwithstanding the small size of their bark, and the boasted skill of their pilot, they often ran aground. The bottom being soft, there was no danger; but, nevertheless, at sunset, near the pass of Don Cristoval, they preferred to lie at anchor. The first part of the night was beautifully serene: they saw an incalculable number of falling-stars, all following one direction, opposite to that from whence the wind blew in the low regions of the atmosphere. The most absolute solitude prevailed in this spot, which, in the time of Columbus, was inhabited and frequented by great numbers of fishermen. The inhabitants of Cuba then employed a small fish to take the great sea-turtles. The "fisher-fish," formerly employed

by the Cubans, by means of the flattened disc on his head, furnished with suckers, fixed himself on the shell of the sea-turtle, which was common in the narrow and winding channels of the Bowers. "The fish," says Columbus, "will sooner suffer himself to be cut in pieces than let go the body to which he adheres." The Indians drew to the shore by the same cord, the fisher-fish and the turtle. When Gomara, and the learned secretary of the Emperor Charles V., Peter Martyr d'Anghiera, promulgated in Europe this fact which they had learnt from the companions of Columbus, it was received as a traveller's tale. There is indeed an air of the marvellous in the recital of d'Anghiera, which begins in these words: "Exactly as we follow hares with greyhounds in the fields, so do the natives of Cuba take fishes with other fish trained for that purpose." We now know, from the united testimony of Rogers, Dampier, and Commerson, that the artifice resorted to in the Bowers to catch turtles, is employed by the inhabitants of the eastern coast of Africa, near Cape Natal, at Mozambique, and at Madagascar. In Egypt, at San Domingo, and in the lakes of the valley of Mexico, the method practised for catching ducks was as follows: men, whose heads were covered with great calabashes pierced with holes, hid themselves in the water, and seized the birds by the feet. The Chinese, from the remotest antiquity, have employed the cormorant, a bird of the pelican family, for fishing on the coast: rings are fixed round the bird's neck to prevent him from swallowing his prey, and fishing for himself. In the lowest degree of civilization, the sagacity of man is displayed in the stratagems of hunting and fishing: nations, who

probably never had any communication with each other, furnish the most striking analogies in the means they employ in exercising their empire over animals.

It was three days before the travellers could leave this labyrinth of Gardens and Bowers. At night they lay at anchor; by day they visited the islands, or chains of rock, that were most easily accessible.

One day while they were employed in herborizing on the Cayo Bonito, their sailors were searching among the rocks for lobsters. Disappointed at not finding lobsters there, they avenged themselves by climbing on the mangroves and making a dreadful slaughter of the young alcatras, grouped in pairs in their nests. With the want of foresight peculiar to the great pelagic birds, the alcatra builds his nest where several branches of trees unite together Humboldt and Bonpland counted four or five nests on the same trunk of a mangrove. The young birds defended themselves valiantly with their enormous beaks, which were six or seven inches long; the old ones hovered over their heads, making hoarse and plaintive cries. Blood streamed from the tops of the trees, for the sailors were armed with great sticks and cutlasses. In vain were they reproved for this cruelty. Condemned to long obedience in the solitude of the seas, they felt pleasure in exercising a cruel tyranny over animals, when occasion offered. The ground was covered with wounded birds struggling in death. At the arrival of the sailors a profound calm prevailed in this secluded spot; when they left, everything seemed to say: Man has passed this way.

They sailed along the coast keeping two or three miles distant from land. On the 13th, a little before sunset,

they were opposite the mouth of the Rio San Juan, which was dreaded by navigators on account of the innumerable quantity of mosquitos and zancudos which filled the atmosphere. Humboldt passed a great part of the night on deck. The coast was dreary and desolate. Not a light announced a fisherman's hut. There was no village between Batabano and Trinidad, a distance of fifty leagues; scarcely were there more than two or three farm-yards, containing hogs or cows. Yet, in the time of Columbus, this territory was inhabited along the shore. When the ground is dug to make wells, or when torrents furrow the surface of the earth in floods, stone hatchets and copper utensils are often discovered.

On the 14th the travellers entered the Rio Guaurabo, one of the two ports of Trinidad de Cuba, to put on shore the pilot of Batabano, who had steered them across the flats of the Bowers, though not without causing them to run aground several times. They also hoped to find a packet-boat in this port, which would take them to Carthagena. Humboldt landed towards evening, and placed Borda's azimuth compass and the artificial horizon, on the shore, for the purpose of observing the passage of some stars by the meridian; but they had scarcely begun their preparations, when a party of traders, who had dined on board a foreign ship recently arrived, invited them to accompany them to the town. They requested the travellers to mount two by two on the same horse; and, as the heat was excessive, their offer was accepted.

The road leading to the port was brilliantly illuminated by phosphorescent insects. The grass that overspread the ground, the branches and foliage of the trees, all shone with a reddish and moveable light, which varied

in its intensity at the will of the animal by which it was produced. It seemed as though the starry firmament reposed on the savannah. In the hut of the poorest inhabitants of the country, fifteen of these insects, placed in a calabash pierced with holes, afforded sufficient light to search for anything during the night. To shake the calabash forcibly was all that was necessary to excite the animal to increase the intensity of the luminous discs situated on each side of its body. The people of the country remarked, that calabashes filled with these phosphorescent insects were lanterns always ready lighted. They were, in fact, only extinguished by the sickness or death of the insects, which were easily fed with a little sugar-cane. A young woman at Trinidad de Cuba told the travellers, that during a long and difficult passage from the main land, she always made use of their phosphorescence when she gave suck to her child at night; the captain of the ship would allow no other light on board, from the fear of corsairs.

The travellers quitted Trinidad on the night of the 15th. The municipality caused them to be conducted tc the mouth of the Rio Guaurabo in a fine carriage lined with old crimson damask; and, to add to their confusion, an ecclesiastic, the poet of the place, habited in a suit of velvet notwithstanding the heat of the climate, celebrated, in a sonnet, their voyage to the Orinoco.

On the morning of the 17th they came within sight of the most eastern island of the group of the Lesser Caymans.

As long as they were within sight of this island, sea-turtles of extraordinary dimensions swam round their vessel. The abundance of these animals led Columbus to give the whole group of the Caymans the name of

"The Rocks of the Turtles." The sailors would have thrown themselves into the water to catch some of these animals; but the numerous sharks that accompanied them, rendered the attempt too perilous. The sharks fixed their jaws on great iron hooks which were flung to them; these hooks were very sharp and, for want of fish-hooks with chains, they were tied to cords. The sharks were in this manner drawn up half the length of their bodies; and the voyagers were surprised to see that those which had their mouths wounded and bleeding continued to seize the bait over and over again during several hours.

The passage from the island of Cuba to the coast of South America terminated at the mouth of the Rio Sinu, and it occupied sixteen days. The roadstead near the Punta del Zapote afforded bad anchorage; and in a rough sea, and with a hard wind, the travellers found some difficulty in reaching the coast. Everything denoted that they had entered a wild region, rarely visited by strangers. A few scattered houses formed the village of Zapote: they found a great number of mariners assembled under a sort of shed, all men of colour, who had descended the Rio Sinu in their barks, to carry maize, bananas, poultry, and other provisions, to the port of Carthagena. Their barks, which were from fifty to eighty feet long, belonged for the most part to the planters of Lorica. The Zambos of the Rio Sinu wearied the travellers with idle questions respecting the purpose of their voyage, their books, and the use of their instruments. They regarded them with mistrust; and to escape from their importunate curiosity, the travellers went to herborize in the forest, although it rained. The Zambos had endeavoured, as usual, to alarm them by

stories of boas, vipers, and the attacks of jaguars; but during a long residence among the Chayma Indians of the Orinoco, the travellers were used to these exaggerations. Quitting the coast of Zapote, covered with mangroves, they entered a forest remarkable for a great variety of palm-trees.

After an hour's walk, they found, in a cleared spot, several inhabitants employed in collecting palm-tree wine. The dark tint of the Zambos formed a strong contrast with the appearance of a little man with light hair and a pale complexion, who seemed to take no share in the labour. Humboldt thought at first that he was a sailor who had escaped from some North American vessel; but was soon undeceived. This fair-complexioned man was his countryman, born on the coast of the Baltic; he had served in the Danish navy, and had lived for several years in the upper part of the Rio Sinu, near Santa Cruz de Lorica. He had come, to use the words of the loungers of the country, "to see other lands, and to roam about: nothing else." The sight of a man who could speak to him of his country, seemed to have no attraction for him; and, as he had almost forgotten German without being able to express himself clearly in Spanish, the conversation was not very animated. During the five years of his travels in Spanish America, Humboldt found only two opportunities of speaking his native language. The first Prussian he met with was a sailor from Memel, who served on board a ship from Halifax, and who refused to make himself known till after he had fired some musket-shot at his boat. The second, the man he met at the Rio Sinu, was very amicably disposed. Without answering his questions, he con-

tinued repeating, with a smile, "that the country was hot and humid; that the houses in the town of Pomerania were finer than those of Santa Cruz de Lorica; and that, if they remained in the forest, they would have the tertian fever from which he had long suffered." The travellers had some difficulty in showing their gratitude to this man for his kind advice; for according to his somewhat aristocratic principles, a white man, were he barefooted, should never accept money "in the presence of those vile coloured people!" Less disdainful than their European countryman, the travellers saluted politely the group of men of colour, who were employed in drawing off into large calabashes, the palm-tree wine, from the trunks of felled trees.

They weighed anchor in the road of Zapote, on the 27th, at sunrise. The sea was less stormy, and the weather rather warmer, although the fury of the wind was undiminished. They saw on the north a succession of small cones of extraordinary form, as far as the Morro de Tigua; these cones were known by the name of the Paps of Santero, Tolu, Rincon, and Chichimar. The two latter were nearest the coast. The Paps of Tolu rose in the middle of the savannahs. There, from the trunks of the Toluifera balsamum was collected the precious balsam of Tolu. In the savannahs of Tolu the travellers saw oxen and mules wandering half wild. In the archipelago of San Bernardo, they passed between the island of Salamanquilla and Cape Boqueron. They had scarcely quitted the gulf of Morosquillo, when the sea became so rough, that the waves frequently washed over the deck of their little vessel. Their captain sought in vain a sheltering-place on the coast, to the north of the village

of Rincon. They cast anchor at four fathoms; but having discovered that they were lying over a reef of coral they preferred the open sea.

The wind having dropped during the night they could only advance to the island of Arenas, where they anchored. The weather became stormy during the night. They again set sail on the morning of the 29th, hoping to be able to reach Boca Chica that day. The gale blew with extreme violence, and they were unable to proceed with their frail bark against the wind and the current, when by a false manœuvre in setting the sails (they had but four sailors), they were during some minutes in imminent danger. The captain, who was not a very bold mariner, declined to proceed further up the coast, and they took refuge, sheltered from the wind, in a nook of the island of Baru.

There was to be an eclipse of the moon during the night, and the next day an occultation of a star in Virgo. The observation of the latter phenomenon might have been very important in determining the longitude of Carthagena. In vain Humboldt urged the captain to allow one of his sailors to accompany him by land to the foot of Boca Chica, a distance of five miles. He objected on account of the wild state of the country, in which there was neither habitation nor path. A little incident, which might have rendered the expedition more fatal, justified the prudence of the captain. Humboldt and Bonpland went by moonlight, to collect plants on the shore; as they approached the land, they saw a young negro issue from the thicket. He was quite naked, loaded with chains, and armed with a long knife. He invited them to land on a part of the beach covered with

large mangroves, as being a spot where the surf did not break, and offered to conduct them to the interior of the island of Baru, if they would promise to give him some clothes. His cunning and wild appearance, the often-repeated question whether they were Spaniards, and certain unintelligible words which he addressed to some of his companions who were concealed amidst the trees, inspired them with mistrust. These blacks were no doubt maroon negroes: slaves escaped from prison. The party from the vessel were without arms; the negroes appeared to be more numerous than they were, and, thinking that possibly they invited them to land with the desire of taking possession of their canoe, they thought it prudent to return on board.

On the morning of the 30th they doubled Punta Gigantes, and made for the Boca Chica, the entrance of the port of Carthagena. From thence the distance was seven or eight miles to the anchorage near the town; and although they took a pilot to guide them, they repeatedly touched on the sandbanks. On landing, Humboldt learned, with great satisfaction, that the expedition appointed to take the survey of the coast, had not yet put to sea. This circumstance not only enabled him to ascertain the astronomical position of several towns on the shore, which had served him as points of departure in fixing chronometrically the longitude of the Llanos and the Orinoco, but also served to guide him with respect to the future direction of his journey to Peru. The passage from Carthagena to Porto Bello, and that of the isthmus by the Rio Chagres and Cruces, were alike short and easy; but it was to be feared, that they might stay long at Panama before they could find an opportunity of pro-

ceeding to Guayaquil, and in that case the voyage on the Pacific would be extremely lingering, as they would have to sail against contrary winds and currents. The persons they consulted all agreed that the journey by land along the Cordilleras, by Santa Fé de Bogota, Popayan, Quito, and Caxamarca, would be preferable to the sea-voyage, and would furnish an immense field for exploration. The predilection of Europeans for the cold and temperate climate that prevailed on the back of the Andes, gave further weight to these counsels. The distances were known, but Humboldt was deceived with respect to the time it would take to traverse them on mules' backs. He did not imagine that it would require over eighteen months to go from Carthagena to Lima. Notwithstanding this delay, or rather owing to the slowness with which he passed through Cundinamarca, the provinces of Popayan, and Quito, he did not regret having sacrificed the passage of the isthmus to the route of Bogota, for every step of the journey was full of interest both geographically and botanically. This change of direction gave him occasion to trace the map of the Rio Magdalena, to determine astronomically the position of eighty points situated in the inland country between Cartha gena, Popayan, and the upper course of the river Amazon and Lima, to discover an error in the longitude of Quito, to collect several thousand new plants, and to observe on a vast scale the relations between the rocks of syenitic porphyry and trachyte, with the fire of volcanoes.

During the six days of their stay at Carthagena their most interesting excursions were to the Boca Grande, and the hill of Popa. A small portion of hilly land sepa-

rated the town of Carthagena and the islet of Manga from the Cienega de Tesca. These hills, some of which were more than five hundred feet high, commanded the town. The Castillo de San Lazaro was seen from afar rising like a great rocky pyramid; when examined nearer its fortifications were not very formidable. Layers of clay and sand were covered with bricks, and furnished a kind of construction which had little stability. The Cerro de Santa Maria de la Popa, crowned by a convent and some batteries, rose above the fort of San Lazaro, and was worthy of more solid and extensive works. The image of the Virgin, preserved in the church of the convent, had been long revered by mariners. The view from the Popa was extensive and varied, and the windings and rents of the coast gave it a peculiar character. Humboldt was assured that sometimes from the windows of the convent, and even in the open sea, before the fort of Boca Chica, the snowy tops of the Sierra Nevada de Santa Marta were discernible.

In order to avoid the excessive heats, and the diseases which prevailed during the summer at Carthagena, the travellers removed inland to the village of Turbaco. This small Indian village stood on a hill, at the entrance of a majestic forest, which extended towards the south and the east as far as the canal of Mahates and the river Magdalena. The houses were mostly built of bamboos, and covered with palm leaves. Here and there limpid springs rose out of the calcareous rock, which contained numerous fragments of petrified coral, and were shaded by the splendid foliage of the anacardium caracoli, a tree of colossal size, to which the natives attributed the property of attracting from great distances the vapours float-

ing in the atmosphere. As the soil of Turbaco was more than nine hundred feet above the level of the ocean, a delightful coolness prevailed, especially during the night.

The Indians of Turbaco, who accompanied the travellers in their herbalizations, spoke of a marshy country, situated in a forest of palm trees, and called by the Creoles the Little Volcanoes. They related that, according to a tradition still existing among them, this spot had formerly been in flames; but that a very pious man, a vicar of the village, had succeeded by his frequent aspersions of holy water in extinguishing the subterraneous fire. They added, that, since this time, the fiery volcano had become a water volcano. From their long residence in the Spanish colonies, the travellers were familiar with the strange and marvellous stories, which the natives eagerly recited to fix the attention of travellers on the phenomena of nature; though they knew, that these stories were in general less indebted for their currency to the superstition of the Indians, than to that of the whites, the mulattoes, and the African slaves; and that the reveries of a few individuals, who reasoned on the progressive changes of the surface of the globe, gradually assumed the character of historical traditions. Without giving any credit to the existence of an extent of country in a former state of ignition, they were conducted by the Indians to the Volcanoes; and this excursion made them acquainted with phenomena, much more important than any they could have expected.

The Volcanoes were situated to the east of the village of Turbaco, in a thick forest, abounding with balsam of Tolu trees. The ground rose gradually two hundred

and fifty or three hundred feet above the village of Turbaco; but as it was everywhere covered with vegetation, it was not possible to distinguish the nature of the rocks that reposed on the shelly calcareous soil.

In the centre of a vast plain were eighteen or twenty small cones, in height not above twenty-five feet. These cones were formed of a blackish gray clay, and had an opening at their summits filled with water. On approaching these small craters, a hollow but very distinct sound was heard at intervals, fifteen or eighteen seconds previous to the disengagement of a great quantity of air. The force with which this air rose above the surface of the water led them to suppose, that it underwent a great pressure in the bowels of the earth. Humboldt generally reckoned five explosions in two minutes; and this phenomenon was often attended with a muddy ejection. The Indians assured him, that the forms of the cones suffered no visible change in a great number of years; but the ascending force of the gas, and the frequency of the explosions, appeared to vary according to the seasons. He found by analyses made by means both of nitrous gas and of phosphorus, that the disengaged air scarcely contained a thousandth part of oxygen. It was azotic gas, much more pure than that which is generally prepared in laboratories.

CHAPTER VI.

COLOMBIA AND PERU.

COMPLETING about the end of April the observations they proposed to make at the northern extremity of the torrid zone, Humboldt and Bonpland were on the point of proceeding to Vera Cruz with the squadron of Admiral Ariztizabal; but being misled by false intelligence respecting the expedition of Captain Baudin, they were induced to relinquish the project of passing through Mexico on their way to the Philippine Islands. The public journals announced that two French sloops, the "Géographe" and the "Naturaliste," had sailed for Cape Horn; that they were to proceed along the coasts of Chili and Peru, and thence to New Holland. This intelligence revived in Humboldt's mind all the projects he had formed during his stay in Paris, when he solicited the Directory to hasten the departure of Captain Baudin. The travellers at once set to work and divided their precious herbals into three portions, to avoid exposing to the risks of a long voyage the objects they had obtained with so much difficulty on the banks of the Orinoco, the Atabapo, and the Rio Negro. They sent one collection by way of England to Germany, another by way of Cadiz to France, and a third remained at

Havanna. They had reason to congratulate themselves on this foresight: each collection contained nearly the same species, and no precautions were neglected to have the cases, if taken by English or French vessels, remitted to Sir Joseph Banks, or to the professors of natural history at the Museum at Paris. It happened fortunately that the manuscripts which Humboldt at first intended to send with the collection to Cadiz, were not intrusted to Fray Juan Gonzales, who had followed them to Havanna with the view of returning to Spain. He left the island of Cuba soon after the travellers, but the vessel in which he sailed foundered on the coast of Africa, and the cargo and crew were all lost. By this event the travellers lost some of the duplicates of their herbals, and what was more important, all the insects which Bonpland had with great difficulty collected during their voyage to the Orinoco and the Rio Negro.

Their collections shipped, the travellers ascended the Rio Magdalena, Bonpland, as was his wont, exploring the botanical treasures of the shore, and Humboldt making a chart of the river district. The sky was cloudy, but the nights were tropically fine. Their old torments, the mosquitos followed them. By and by they passed the little city of Monpex, with its white houses and its red roofs. They saw the inhabitants chatting before the doors of their dwellings (it was evening at the time,) and promenading the darkening streets. In addition to the plague of mosquitos, which kept them most of the day in their hammocks, the inhabitants of Monpex were horribly disfigured with goitres. Their city was surrounded with swamps, and was liable to inundations. Sometimes they were obliged to desert their houses, and

take to their canoes. Crocodiles came up to the banks to feed on the offal thrown from the city.

From Monpox to Santa Margarita the shore was bordered with orange and lemon trees. At Pinon they saw the mountains in the interior. The depth of the water increasing along the shore, they were now and then obliged to lay in the poles, and haul along by the trees. They passed the island of Morales, which was shaded with cocoa palms. Beyond Badillo the crocodiles diminished, and cocoa plantations began. Sometimes the river, broadening, resembled a large lake, bordered with forest-trees. At such places the travellers saw their old friends of Cumana and the Orinoco, flamingoes, herons, parrots, and macaws, and hordes of howling monkeys. Turtles were plentiful, as were also crocodiles and jaguars. They saw the crocodiles and jaguars fighting on the banks as they passed. At last they reached the town of Honda, having been thirty-five days on the river.

From Honda they proceeded on mules to Bogota. The road was more like the bed of a torrent than a road. They descended from the mountain of Sarjento into the picturesque valley of Guaduas; then they climbed the steep sides of the Alta del Trigo, and again descended to the plain of Villietas. From the paramo of Cerradera they saw the plains of Bogota, though they were still nine leagues from the capital. At last they came in sight of the white towers of the cathedral, and the monasteries of Monserrat and Guadalupe.

The travellers arrived at Bogota in June, and remained till September, pursuing their botanical and geographical researches, and making excursions to the natural curiosities of the neighborhood.

The plain of Bogota was encircled with lofty mountains; and the perfect level of the soil, its geological structure, the form of the rocks of Suba and Facatativa, which rose like small islands in the midst of the savannas, all served to indicate the existence of an ancient lake. The Rio Funzha, into which flowed the waters of the valley, forced its way through the mountains to the south-west of Bogota. Near the farm of Canoas this river rushed from the plain by a narrow outlet into a crevice, which descended towards the basin of the Rio Magdalena. Here were the celebrated falls of Tequendama. Taking one pleasant day the road which led to the falls, the travellers passed the village of Suacha, and the great farm of Canoas, famous for its crops of wheat. At a small distance from the farm, on the height of Chipa, they found themselves surrounded with oaks and elms, and plants which recalled to their minds the vegetation of Europe. Looking down, as from a terrace, they discovered below them a country producing bananas and sugar canes. They descended by a dangerous pathway to the brink of the precipice, into which the river threw itself. At a short distance above them it was one hundred and forty feet broad, but as it drew near the fall it contracted itself in a deep but narrow bed, scarcely forty feet wide, and plunged at two bounds down a perpendicular rock to the depth of six hundred and fifty feet. It came on like a broad arch of glass; as soon as it was over the brink of the precipice it became a fleece of spray, which was changed in its descent to mist. The mist rose, however, to a considerable height, and was crowned with glittering rainbows. From the rocky sides of the crevice, hung with shrubs and bushes, gushed innumerable springs

and tributary streams, and over and around all darted strange birds, with beautiful plumage. A great portion of the fall was lost in vapour; what little was left below, a dwindled streamlet, rushed impetuously along a stony bed overhung with trees, and was lost in the dark windings of the rock. The crevice into which the river plunged, communicating with the plains of the warm regions, a few palm trees had sprung up at the foot of the cataract. This led the inhabitants of Bogota to say that the river plunged from a hot into a cold country. Humboldt succeeded, not without danger, in carrying his instruments into the crevice. It took him three hours to reach the bottom by a narrow path. A few feeble rays of noon fell on the bottom of the crevice. The solitude of the place, the richness of the vegetation, and the dreadful roar that struck upon his ear, were long remembered by him. He considered it one of the wildest scenes in the whole range of the Cordilleras.

The column of vapour, rising like a thick cloud from the falls, could be seen from the walks round Bogota, at five leagues distance.

There was a legend connected with the place: "In the remotest times," it ran, "before the moon accompanied the earth, the inhabitants of the plain of Bogota lived like barbarians, naked, without agriculture, without any form of laws or worship. Suddenly there appeared among them an old man, who came from the plains situate on the east of the Cordillera of Chingasa, and who appeared to be of a race unlike that of the natives, having a long and bushy beard. He was known by three distinct appellations, Bochica, Nemquetheba, and Zuhé. This old man instructed men how to clothe

themselves, build huts, till the ground, and form themselves into communities. He brought with him a woman, to whom also tradition gives three names, Chia, Yubecayguaya, and Huythaca. This woman, extremely beautiful and not less malignant, thwarted every enterprise of her husband for the happiness of mankind. By her skill in magic she swelled the Rio Funzha, and inundated the valley of Bogota. The greater part of the inhabitants perished in this deluge; a few only found refuge on the summits of the neighbouring mountains. The old man, in anger, drove the beautiful Huythaca far from the Earth, and she became the Moon, which began from that epoch to enlighten our planet during the night. Bochica, moved with compassion for those who were dispersed over the mountains, broke with his powerful arm the rocks that inclosed the valley on the side of Canoas and Tequendama. By this outlet he drained the waters of the Lake of Bogota. He built towns, introduced the worship of the Sun, named two chiefs, between whom he divided the civil and ecclesiastical authority, and then withdrew himself, under the name of Idacanzas, into the holy valley of Iraca, near Tunja, where he lived in the exercise of the most austere penitence for the space of two thousand years."

After the excursion to the Falls of Tequendama, the travellers visited the Lake of Guatavita. It was situated to the north of Bogota, in a wild and solitary spot, on a ridge of the mountains of Zipaguira, at a height of eight thousand five hundred feet. It was held in veneration by the Indians in the olden time, who were supposed to have repaired thither for the purpose of ablution and purification. The travellers found the

remains of a flight of steps, by which the Indians were accustomed to descend to the water, and a channel by which the Spaniards, after the conquest, had attempted to drain the lake, to recover the treasures which were said to have been concealed there when Quesada and his cavalry appeared on the plains of Cundinamarca. It lay on a plain, surrounded by mountains. Its basin was a sort of half oval, whose stony sloping sides were over grown with bushes and trees.

Towards the end of September Humboldt and Bonpland bade Bogota adieu, and started for Quito. Out of two roads which they might have taken, like true naturalists they chose the worst. The road from Bogota to Fusagasuga and thence to Icononzo was one of the most difficult and least frequented in the Cordilleras. "The traveller," Humboldt afterwards wrote, "must feel a passionate enthusiasm for the beauties of nature, who prefers the dangerous descent of the desert of San Fortunato, and the mountains of Fusagasuga, leading towards the natural bridges of Icononzo, to the usual road by the Mesa de Juan Diaz, to the banks of the Magdalena."

Journeying two days in a south-easterly direction they came to Icononzo, a ruined town of the Muysco Indians. It lay at the southern end of a valley of the same name. The rocks of this valley seemed to have been carved by the hand of man. Their naked and barren summits presented a picturesque contrast with the tufts of trees and shrubs which covered the brinks of a deep crevice in the centre of the valley. Through this valley ran a small torrent called the Rio de la Summa Paz. To this torrent the travellers came, nor could they have crossed it, without great difficulty, had not nature provided two

bridges of rocks, like the natural bridge in Virginia The highest of these bridges was forty-six feet in length, and nearly forty in breadth; its thickness in the centre was about seven feet. Humboldt experimented on its height, and found it three hundred and twelve feet above the level of the torrent. For the safety of travellers the Indians of the valley had formed a small balustrade of reeds, extending along the precipitous road leading to the bridge.

Sixty feet below this bridge was another, to which the travellers were led by a narrow pathway, descending along the brink of the crevice. In the middle of the second bridge was a hollow of more than twenty-four feet square, through which they perceived the bottom of the abyss. The torrent seemed to flow through a dark cavern, from which arose a melancholy noise, caused by the numberless flights of nocturnal birds that haunted the crevice. Humboldt at first mistook them for bats of gigantic size. Thousands of them were seen flying over the surface of the water. The Indians assured him that these birds were of the size of a fowl, with a curved beak and an owl's eye. They were called cacas. It was impossible to catch them, on account of the depth of the valley; and they could be examined only by throwing down rockets, to illumine the sides of the crevice.

Leaving the bridges of Icononzo, the travellers pursued their journey until they came to the mountain of Quindiu. At the entrance of this mountain, near Ibague, they saw the truncated cone of Zolima covered with perpetual snow. The little river of Combeima wound along a narrow valley, and forced its way across a thicket of palm-trees.

The mountain of Quindiu was considered the most difficult passage in the Cordilleras of the Andes. It was a thick, uninhabited forest, which, in the finest season, could not be traversed in less than ten or twelve days. Not even a hut was to be seen, nor could any means of subsistence be found. Travellers, at all times of the year, furnished themselves with a month's provision, since it often happened, that, by the melting of the snows, and the sudden swell of the torrents, they found themselves so circumstanced, that they could descend neither on the side of Cartago, nor that of Ibague. The highest point of the road, the Garito del Paramo, was one thousand four hundred and fifty feet above the level of the sea. As the foot of the mountain, towards the banks of the Cauca, was only three thousand one hundred and forty feet, the climate there was, in general, mild and temperate. The pathway which formed the passage of the Cordilleras was only about a foot in breadth, and had the appearance, in several places, of a gallery dug, and left open to the sky. In this part of the Andes the rock was covered with a thick stratum of clay. The streamlets which flowed down the mountains, had hollowed out gullies eighteen or twenty feet deep. Along these crevices, which were full of mud, the travellers were forced to grope their passage, the darkness of which was increased by the thick vegetation that covered the opening above. The oxen, which were the beasts of burden commonly made use of in this country, could scarcely force their way through these galleries, some of which were two thousand yards in length; if a traveller had met them in one of these passages, he could not have avoided them, but by turning back, and climb-

ing the earthen wall which bordered the crevice, and keeping himself suspended, by laying hold of the roots which penetrated to this depth from the surface of the ground.

They traversed the mountain of Quindiu in October, on foot, followed by twelve oxen, which carried their collections and instruments, amidst a deluge of rain, to which they were exposed during the last three or four days in their descent on the western side of the Cordilleras. The road passed through a country full of bogs, and covered with bamboos. Their shoes were so torn by the prickles which shoot out from the roots of these gigantic *gramina*, that they were forced, like all other travellers who disliked being carried on men's backs, to go barefooted. This circumstance, the continued humidity, the length of the passage, the muscular force required to tread in a thick and muddy clay, and the necessity of fording deep torrents of icy water, rendered this journey extremely fatiguing; but, however painful, it was accompanied by none of those dangers with which the credulity of the people alarmed travellers. The road was narrow, but the places where it skirted precipices were very rare. As the oxen were accustomed to put their feet in the same tracks they formed small furrows across the road, separated from each other by narrow ridges of earth. In very rainy seasons, these ridges were covered with water, which rendered the steps of the travellers doubly uncertain, since they knew not whether they placed their feet on the ridge or in the furrow.

The usual mode of travelling for persons in easy circumstances, was in a chair, strapped to the back of one of the native porters, who lived by letting out their backs

and loins to travellers. They talked in this country of going on a man's back, as we mention going on horseback. No humiliating idea was annexed to the trade of porters; and the men who followed that occupation were not Indians, but mulattoes, and sometimes even whites. It was curious to hear these men, with scarcely any covering, quarrelling in the midst of a forest, because one had refused the other, who pretended to have a whiter skin, the pompous title of *don*, or of *su merced*. The usual load of a porter was six or seven arrobas; those who were very strong carried as much as nine arrobas. When we reflect on the enormous fatigue to which these miserable men were exposed, journeying eight or nine hours a day over a mountainous country; when we know, that their backs were sometimes as raw as those of beasts of burden; that travellers had often the cruelty to leave them in the forests when they fell sick; that they earned by a journey from Ibague to Cartago, only twelve or fourteen piasters in from fifteen to twenty-five days; we are at a loss to conceive how this employment of a porter was so eagerly embraced by all the robust young men who lived at the foot of the mountains. The taste for a wandering life, the idea of a certain independence amid forests, led them to prefer it to the sedentary and monotonous labour of cities. The passage of the mountain of Quindiu was not the only part of South America which was traversed on the backs of men. The whole of the province of Antioquia was surrounded by mountains so difficult to pass, that those who disliked entrusting themselves to the skill of a bearer, and were not strong enough to travel on foot from Santa Fé de Antioquia to Bocca de Nares or Rio

Samana, relinquished all thoughts of leaving the country. Humboldt was acquainted with an inhabitant of this province so immensely bulky, that he had not met with more than two mulattoes capable of carying him; and it would have been impossible for him to have returned home, if these two carriers had died while he was on the banks of the Magdalena, at Monpox, or at Honda. The number of young men who undertook the employment of beasts of burden at Choco, Ibague, and Medellin, was so considerable, that the travellers sometimes met a file of fifty or sixty. A few years later, when a project was formed to make the passage from Naires to Antioquia passable for mules, the porters presented formal remonstrances against mending the road, and the government yielded to their clamours. The person carried in a chair by a porter was compelled to remain several hours motionless, and leaning backwards. The least motion was sufficient to throw him down, and his fall was so much the more dangerous, as the porter, confident in his own skill, generally chose the most rapid declivities, or crossed a torrent on a narrow and slippery trunk of a tree. These accidents were, however, rare; and those which happened were attributed to the imprudence of travellers, who, frightened at a false step of the porters, leaped down from their chairs.

At Ibague, before the porters started on their journey across Quindiu, they plucked on the neighbouring mountains several hundred leaves of the vijao, a plant of the family of bananas. These leaves were twenty inches long, and fourteen inches broad. Their lower surface was covered with a farinaceous substance which fell off in scales. This peculiar varnish enabled them to resist the

rain for a long time. Of these leaves, with which they were plentifully supplied on their journey, the porters made a roof; a hundred weight was sufficient to cover a hut large enough to hold six or eight persons. When Humboldt and Bonpland stopped for the night, in Quindiu, they picked out a spot in the forest where the ground was dry, and the porters lopped from the trees a few branches, and made a tent. Dividing their timber-work into squares, by the stalks of some climbing plants that grew near, or perhaps by the threads of the agave, they spread over this frame-work their vijao leaves, the stems of which were notched so as to hang, row overlapping row, like the tiles of a house. The travellers found these extemporized houses cool and commodious: if they felt the rain during the night, they had only to point out the spot through which it dropped upon them —a single leaf would mend it.

Day after day passed, and they were still on the mountains of Quindiu, struggling along its difficult paths, now buried in the depths of its forests, and now emerging into solitary openings, rugged and stern with rocks. When the rain ceased, and the sun shone, a varied prospect opened before them; deep but irregular valleys: table-lands of rock sloping away precipitously: barren-looking hills whose sides were studded with trees; now and then a gigantic cactus like a bundle of broken spears; forests before and behind, and in the distance the snowy cone of Zolima, looming among the ragged peaks, in a wilderness of clouds! Then the sky would be overcast, and the rain would fall in torrents, drenching them to the skin.

They reached Popayan in November, and rested there awhile to recruit themselves. Popayan was situated in

the beautiful valley of the Rio Cauca, at the foot of the great volcanoes of Puracé and Sotara. They visited these volcanoes during their stay. On ascending from Popayan towards the top of Puracé they found, at an elevation of eight thousand feet, a small plain inhabited by Indians, and cultivated with the greatest care. This delightful plain was bounded by two ravines extremely deep, on the brink of which the houses of the village of Puracé were built. Waters sprang out profusely from the porphyritic rock; every garden was inclosed by a hedge of euphorbiums, with slender leaves, and of the most delicate green. Nothing could be more agreeable than the contrast of this beautiful verdure with the chain of black and arid mountains, which surrounded the volcano, and which were cleft and torn asunder by earthquakes.

The village of Puracé was celebrated in the country for the beautiful cataracts of the Rio Pusambio, the waters of which were acid, and were called by the Spaniards Rio Vinagre. This small river was warm towards its source, and probably owed its origin to the daily melting of the snows, and the sulphur that burned in the interior of the volcano. It formed, near the plains, three cataracts, the two uppermost of which were very striking. Humboldt sketched the second of these in the garden of an Indian, near the house of the missionary of Puracé. The water which made its way through a cavern precipitated itself downward nearly four hundred feet. The cascade was extremely picturesque, but the inhabitants of Popayan regretted that the river was not ingulfed in some abyss, instead of mingling, as it did, with the Rio Cauca. For the latter river was destitute of fish for four leagues, on account of the mixture of its waters with those

of the Rio Vinagre, which were loaded with oxide of iron, and sulphuric and muriatic acids.

The travellers arrived at Quito on the 6th of January, 1802, and remained there nearly nine months. How they filled up the greater part of this time is not stated; but from the number of celebrated mountains in the neighbourhood, most of which they visited, and from their omnivorous taste in the sciences, it is certain that it seldom or never hung heavily on their hands. They had first to look after their instruments and their collections; Humboldt had to complete his map of the Rio Magdalena, and Bonpland to arrange his crowded herbal. Then there were visits to be received, and returned; excursions to be planned and executed: in short a thousand ways to make the days and months slip away unperceived. When not in the city of Quito itself they resided in the neighbourhood, in the villas and country houses of their friends. Humboldt resided at one time in the hacienda of General Aguerré, at Chileo, where his portrait was painted by a Quitan artist, and where it still hangs. When Mr. Church, our greatest landscape painter, was in South America, making studies for his magnificent painting, "The Heart of the Andes," he lodged in the very room that Humboldt occupied, and struck with his portrait, which continually met his eyes on the wall, he procured a copy of it, from a pupil of the artist who painted it, and brought it with him, in his return to the United States. It is an invaluable relict of the great traveller, representing him, not as we know him from later engravings and photographs, a gray old man, with his head drooping on his bosom, heavy with its harvest of thought; but in the vigour of manhood, thin and muscular, with

his hair long, as was the fashion then, and in a Prussian uniform. The pleasant look of the old face is there, and the beautiful blue eyes; but the look is more eager and longing, and the eyes are brighter and keener. A copy of the same picture hangs in the old castle at Tegel.

The months of May and June were devoted to mountains and volcanoes, which abounded in the regions about Quito. Within the space of thirty-seven leagues to the west, were Casitagua, Pichincha, Atacazo, Corazon, Illiniza, Carguairazo, Chimborazo, and Cumambag: to the east, were Guamani, Antisana, Passuchoa, Rumminnavi, Cotopaxi, Quelendanna, Tungurahua, and Capa-Ureu. Humboldt visited several of these mountains, but two of the grandest ones, Chimborazo and Cotopaxi, he was unable to ascend.

Cotopaxi was situated twelve leagues from the city, to the south-east, between the mountain of Rumminnavi, the summit of which, rugged with small separate rocks, extended like a wall of enormous height, and Quelendanna, which entered the boundaries of eternal snow. Its height was eighteen thousand seven hundred feet. The masses of scoriæ and huge pieces of rock, which it had in former times vomited from its fiery depths, were spread over the neighbouring valleys, covering a space of several square leagues; could they have been collected and heaped together, they would have formed a colossal mountain, as large perhaps as Cotopaxi itself. Cotopaxi was the most dreadful mountain in the whole kingdom of Quito. During one of its eruptions in 1739, flames rose into the lurid air three thousand feet above the brink of its crater. In 1744 its roaring was heard as far as Honda, a distance of two hundred leagues. In

1768 the quantity of ashes sifted from it was so great, that in the towns of Hambato and Tacunga, day broke only at three o'clock in the afternoon, and the inhabitants were obliged to use lanterns in the streets.

The summit of Cotopaxi was one of the most beautiful and regular of all the colossal summits of the Cordilleras. It was a perfect cone, covered with an enormous layer of snow, which at sunset shone with a dazzling splendour, detaching itself picturesquely from the intensely blue sky. This covering of snow concealed from the eyes of the travellers the smallest inequalities of the soil; no point of rock, no stony mass penetrated this coat of ice, or broke the regularity of the figure of the cone. Near the brink of the crater they saw a ledge of rock which was never covered with snow, and which looked like a series of belts of the darkest hue. The cone was too steep here for the snow ever to lodge upon it; besides, currents of heated air were continually issuing from the crevices. The soul of Winter himself would have shrunk into nothingness before these "blasts from hell."

The crater of Cotopaxi, like that of Teneriffe, was surrounded by a circular wall, which the travellers were unable to scale; for unlike the crater of Teneriffe it had no opening. The lava which had poured over its horrible brink had never yet made a breach in it. Indeed they found it difficult to attain even the inferior boundary of perpetual snow: so they were reluctantly compelled to descend. Humboldt made two sketches of the volcano, one at Suniguaicu, from a ridge of porphyritic mountains which joined Cotopaxi to the Nevada of Quelendanna—a southern view of the crater, near the

limit of eternal snow; the other, a westerly view from the terrace of a beautiful country house, belonging to his friend, the Marquis of Maenza, with whom he occasionally lodged during his residence in Quito.

On the 22nd of June, the birthday of his brother, Humboldt commenced his ascent of Chimborazo, accompanied by Bonpland and Carlos de Montufar, a young Spanish naturalist. They started from the plain of Tapia, at an elevation of over nine thousand feet. This arid table-land was near the village of Lican, the ancient residence of the sovereigns of Quito. From Lican to the summit of Chimborazo was nearly five leagues in a straight line. They followed the plain, leaving behind them groups of Indians bound to the market of Lican, and slowly ascending halted for the night at the little village of Calpi. They were now at the foot of Chimborazo. It rose before them stupendously in the light of the setting sun. The foreground was veiled in the vaporous dimness that striped the lower strata of the air, but as they cast their eyes towards the summit it detached itself from the deep blue sky. They saw above the region of ligneous plants and alpine shrubs a broad belt of grass like a gilded yellow carpet. Beyond this was a region of porphyritic rocks, and beyond these rocks, eternal ice and snow. As the earth below grew darker, the heaven above seemed to grow brighter; their sight was dazzled with the refulgent splendour of the snow.

Early the next morning their Indian guides awoke them, and they began to climb the mountain on the south-western side, traversing the great plains which rose like terraces, one above another, until they reached the plain of Sisgun, twelve thousand four hundred feet

above the level of the sea. Here Humboldt wished to make a trigonometrical measurement to ascertain the height of the summit, but it was shrouded in thick clouds. From time to time they caught a momentary glimpse of it, through openings in the clouds, but the sky was gradually darkening. They continued to ascend until they reached the little lake of Yana-Cocha, a circular basin one hundred and thirty feet in diameter. It was the most elevated spot yet reached by man on the ridge of mountains, three thousand three hundred feet higher than the summit of Mont Blanc. Here they left their mules. The barometer showed a height of fourteen thousand three hundred and fifty feet. Crossing the yellow belt of grass which they had seen over night, they came to a region of augite. Here rocks rose in columns fifty or sixty feet high, and looked like the trunks of trees. Traversing the aisles of this enchanted forest of stone, over fields of new-fallen snow, they gained a narrow ridge which led directly to the summit of Chimborazo, and by which alone they might hope to reach it; for the snow around was too soft and yielding to be ventured upon. The path became steeper and narrower, and at last the guides refused to go any further. When they were sixteen thousand five hundred feet high, all but one left them. Nothing daunted, however, the travellers went on, enveloped in a thick mist. The path which they were ascending was in many places not more than eight or ten inches broad: the natives called it a "knife-blade." On one hand was a declivity of snow covered with a glassy coating of ice, on the other a chasm one thousand feet deep, the bottom of which was covered with masses of naked rocks. They inclined their bodies over this chasm, dangerous as it was, for they dared not trust themselves to the

snowy pitch on the opposite side. Had they stumbled they would either have been buried in the mingled snow and ice, or would have rolled headlong down the steep. The character of the rock, which was brittle and crumbling, increased the difficulty of the ascent. Here and there they were obliged to crawl on their hands and feet; the sharp edges of the rock wounded them, and they left behind a bloody trail. They marched in single file, testing with their poles the stability of the rocks before them. This precaution was very necessary, as many of the rocks were lying loose on the brink of the precipice. Desirous of knowing how much of the mountain remained to be ascended, for the summit was continually hidden from their sight, Humboldt opened the barometer on a point where the path was broad enough to allow two persons to sit side by side: the mercury indicated a height of eighteen thousand three hundred and eighty feet. The temperature of the air was 98°, and that of the earth 107°.

They proceeded for another hour, and found the rocky path less steep; the mist, however, was thicker than ever. They now began to suffer severely from the extreme rarefaction of the air. They breathed with difficulty, and what was still more disagreeable, felt like vomiting. Their heads swam, their lips and gums bled profusely, and their eyelids and eyeballs were charged with blood.

From time to time great birds, probably condors, came swooping down the terrible pass, sailing grandly away; and little winged insects, resembling flies, fluttered gaily around. It was impossible to catch them, owing to the narrowness of the ledge; but Humboldt judged that they were Dipteras. Bonpland saw yellow butterflies, a little lower down, flying very near the ground.

Finally the belts of cloud parted, and they saw on the sudden, the vast dome of Chimborazo It seemed near them, so near that in a few minutes they might reach it. The ledges too seemed to favor them by becoming broader. They hurried onward for a short distance, excited with the hope of soon standing on the pinnacle. All at once the path was stopped by a chasm, four hundred feet deep, and sixty feet broad. There was no way by which they could cross it: the difficulty was insurmountable. To tantalize them still further they saw that the path went forward on the other side of the ledge, evidently reaching the summit. If they could have but crossed that chasm!

It was one o'clock in the afternoon, and they were benumbed with cold. They were nineteen thousand two hundred feet above the level of the sea.

The belt of clouds closed again, and the peak was lost. The mist grew thicker and thicker, and everything indicated a storm. There was nothing left them but to descend. Halting long enough to collect a few specimens of the rock they retraced their steps. A storm of hail overtook them, but as they descended into a lower atmosphere it changed into snow. When they reached the little lake of Yana-Cocha, where they had left their mules, they found the ground covered with snow several inches deep. Before dusk they reached the Indian village of Calpi, and were entertained that night by the priest.

So ended the attempt to scale the summit of Chimborazo.

Not content with his defeat at Chimborazo and Cotopaxi, Humboldt visited several other mountains and volcanoes in the neighbourhood of Quito. If he could not

ascend them, he could at least sketch them, which was something. He visited and sketched Corazon, Illinissa, and Cayambe.

Of the various summits of the Cordilleras, the heights of which have been determined with any precision, Cayambe is the loftiest after Chimborazo. From angles which he took on the Exido of Quito, to observe the progress of the terrestrial refraction at different hours of the day, Humboldt found its elevation to be eighteen thousand seven hundred feet. Its form, which was that of a truncated cone, reminded him of the peak of Zolima, as he saw it looming above the forests of Quindiu. Among the many snow-clad mountains that surrounded the city of Quito he considered it the most beautiful, as well as the most majestic, and it never ceased to excite his admiration when at sunset it threw its vast shadow over the plain.

Illinissa was grand and picturesque. Its summit was divided into two pyramidal points, which were probably the wrecks of a volcano that had fallen in. These pyramids were visible at an enormous distance.

Corazon derived its name from the form of its summit, which was nearly that of a heart. It was on the western Cordillera, between Illinissa and Pichincha. Bouguer and Condamine ascended this mountain in July, 1738. "We began our journey," says Condamine, in his celebrated Voyage to the Equator, "in very fine weather. The persons whom we had left in our tents soon lost sight of us among the clouds, which appeared to us only a mist, from the time we entered them. A cold and piercing wind covered us in a short time with icicles. In several places we were forced to scale the rock, by climbing with

our hands and feet. At length we reached the summit; and on looking at each other, we perceived all one side of our clothes, one of our eyebrows, and half our beards, stuck full of small frozen points, exhibiting a singular spectacle."

In one of their excursions to Riobamba, on the western slope of the volcano of Tunguragua the travellers visited the delightful village of Penipé, where they saw a famous bridge of ropes. It crossed the river of Chambo, which separated the villages of Penipé and Guanando. The ropes of this bridge, which were three or four inches in diameter, were made of the fibrous part of the roots of the *agave Americana*, and were fastened on each bank to a clumsy wooden framework. As their weight made them bend towards the middle of the river, and as it would have been imprudent to have stretched them with too much force, the Indians were obliged, when the banks were low, to form steps or ladders at both extremities of the bridge. That which the travellers crossed at Penipé was a hundred and twenty feet long, and seven or eight broad. The great ropes were covered transversely with small cylindrical pieces of bamboo. These structures, of which the people of South America made use long before the arrival of the Europeans, reminded Humboldt of the chain bridges at Boutan, and in the interior of Africa. Mr. Turner, in his interesting account of his journey to Thibet, gives the plan of the bridge of Tchintchieu, near the fortress of Chuka, which is one hundred and forty feet in length, and which may be passed on horseback.

Travellers had often spoken of the extreme danger of passing over these rope bridges, which look like ribands suspended above a crevice or an impetuous torrent; but

Humboldt did not consider this danger great, when a single person passed over the bridge as quickly as possible, with his body leaning forward. The oscillations of the ropes, however, become very strong, when the traveller is conducted by an Indian who walks quicker than himself; or when frightened by the view of the water which he sees through the interstices of the bamboos, he has the imprudence to stop in the midst of the bridge, and lay hold of the ropes that serve as a rail. A bridge of this kind lasted generally in good condition only twenty or twenty-five years. It was necessary to renew some of the ropes every eight or ten years. But in these countries the police was so negligent, that Humboldt often saw bridges, in which most of the pieces of bamboo were broken. On these old bridges it was necessary to proceed with great circumspection, to avoid holes, through which the whole body might slip. A few years before Humboldt's visit to Penipé, the bridge of the Rio Chambo suddenly broke down. This was owing to a very dry wind having succeeded long rains, in consequence of which all the ropes gave way at the same time. By this accident four Indians were drowned in the river, which was very deep and rapid.

The ancient Peruvians constructed also bridges of wood, supported by piers of stone; though they most commonly satisfied themselves with bridges of ropes. These were extremely useful in a mountainous country, where the depth of the crevices and the impetuosity of the torrents prevented the construction of piers. It was by a bridge of ropes, of extraordinary length, on which travellers could pass with loaded mules, that a permanent communication was established between Quito and Lima,

after uselessly expending upwards of forty thousand pounds sterling, to build a stone bridge, near Santa, over a torrent, which rushed from the Cordillera of the Andes.

But we must not forget the various monuments of the ancient Peruvians, visited by the travellers during their nine months' residence in Quito, especially the Panecillo of Callo, and the House of the Inca Huayna-Capac. They came upon these singular remains in April, on their way to the volcano of Cotopaxi, and Humboldt made a sketch of them as they then appeared. He found them in an immense plain covered with pumice stone. The Panecillo was a conic hillock, about two hundred and fifty feet high, covered with small bushes of molina, spermacoce, and cactus. The natives believed that this hillock, which resembled a bell, and was perfectly regular in its figure, was a tumulus, or one of those numerous hills, which the ancient inhabitants of this country raised for the interment of the sovereign, or some other distinguished personage. It was alleged, in favour of this opinion, that the Panecillo was wholly composed of volcanic rubbish, and that the same pumice stone, which surrounded its basis, was found also on its summit.

This reason might appear little conclusive in the eyes of a geologist, for the back of the neighbouring mountain of Tiopullo, which was much higher than the Panecillo, was also covered with great heaps of pumice stone, probably owing to ancient eruptions of Cotopaxi and Illinissa. We cannot doubt, but that in both Americas, as well as in the north of Asia, and on the banks of the Boristhenes, mounds raised by men, and real tumuli of an extraordinary height, are to be seen. Those which are found amid the ruins of the ancient town of Mansiche,

in Peru, are not much lower than the Panecillo of Callo. It is nevertheless possible, and this opinion appeared to Humboldt the most probable one, that the latter was a volcanic hillock to which the natives had given a more regular form. Ulloa, who visited the Panecillo, and whose authority is of great weight, adopted the opinion of the natives; he even thought that the Panecillo was a military monument; and that it served as a watch tower, to discover what passed in the country, and to insure the prince's safety on the first alarm of an unforeseen attack.

The Inca's House was a little to the south-west of the Panecillo, three leagues from the crater of Cotopaxi, and about ten leagues to the south of the city of Quito. This edifice formed a square, each side of which was one hundred feet long; four great outer doors were still distinguishable, and eight apartments, three of which were in good preservation. The walls were nearly fifteen feet high and three feet thick. The doors were similar to those of Egyptian temples; the niches, eighteen in number in each apartment, were distributed with the greatest symmetry. The stone made use of in building the Inca's House was a rock of volcanic origin, a burnt and spungy porphyry with basaltic bases. It was probably ejected by the mouth of the volcano of Cotopaxi. As this monument appeared to have been constructed in the beginning of the sixteenth century, the materials employed in it proved that it was a mistake to consider as the first eruption of Cotopaxi that which took place in 1533, when Sebastien de Belalcazar made the conquest of the kingdom of Quito. The stones of the Inca's House were cut in parallelopipedons, not all of the same size, but forming courses as regular as those of Roman workman-

ship. During his long abode in the Cordilleras Humboldt never found any structure resembling those which are termed Cyclopean. In every edifice that dated from the time of the Incas, the front of the stones was very skilfully cut, while the back part was rugged, and often angular. Before Humboldt and Bonpland visited the ruins at Callo, Don Juan Larea had remarked, that in the walls of the Inca's House the interstices between the outer and inner stones were filled with small pebbles cemented with clay. Humboldt did not observe this circumstance. He saw no vestige of floor, or roof; he supposed, however, that the latter was of wood. He could not decide whether the edifice had originally more than a single story, or not; as the height of its walls had been diminished no less by the avidity of the neighbouring peasantry, who took away the stones for their own use, than by the earthquakes, to which this unfortunate country was continually exposed.

He thought it probable that this edifice, as well as others which he heard called at Peru, Quito, and as far as the banks of the Amazon, by the name of Inca's Houses, did not date farther back than the thirteenth century.

Some time in August or September Humboldt received intelligence that Baudin's expedition had sailed to New Zealand, intending to pass homeward around the Cape of Good Hope. This frustrated his projected visit to the Philippine Islands. As he was by this time, however, somewhat accustomed to having his plans thwarted, he devised a new route, and as soon as it was practicable he and Bonpland started upon it. About the last of September they left Quito, following the chain of the Andes by the way of Assuay, Cuenca, and Loxa.

The road which led them over the Paramo of Assuay was nearly as high as Mont Blanc. Here it descended a valley, there it ascended a mountain, and a little further on it stretched monotonously across a level plain. In one of these plains, which was six leagues square in breadth, the travellers found lakes of fresh water of considerable depth. These lakes were bordered by a thick turf of Alpine grasses, but contained no fish, and scarcely any aquatic insects. Here they found the remains of the great road of the Incas, which ran by the side of their heavily-laden mules for over a mile. It had a deep understructure, and was paved with well-cut blocks of blackish trap-porphyry. Nothing that Humboldt had seen of the remains of Roman roads in Italy, the South of France, or Spain, was more imposing than these works of the ancient Peruvians. They originally formed a line of communication through all the provinces of the Empire, extending over a length of more than a thousand miles.

Proceeding from Assuay towards Cuenca the road led them to the ancient fortress of Cannar. It was on a hill, terminated by a platform, and was in excellent preservation. A wall built of large blocks of freestone, rose to the height of twenty feet, forming a regular oval, the great axis of which was nearly one hundred and twenty feet in length. The interior of this oval was a flat piece of ground, covered with rich vegetation. In the centre of this inclosure stood the Fortress of Cannar, a house containing only two rooms, the walls of which were twenty feet high. It was probably a lodging-place for the Incas, when they journeyed from Cuzco to the kingdom of Quito. The foundations of a great number of

edifices surrounding the inclosure showed that there was room enough to lodge the small army which generally accompanied the Incas on these journeys. What was curious about the Fortress of Cannar was the form of its roof, which gave it the appearance of a European house. As one of the first historians of America, Pedro de Cieca de Leon, who began to describe his travels in 1541, says that several similar houses, which he examined in the province of Los Canares, were covered with rushes, this roof was probably added after the conquest of Peru by the Spaniards.

Leaving the Fortress of Cannar, the travellers came to a valley hollowed out by the river Gulan. Here they found small foot-paths cut in the rock. These paths led to a fissure, which the ancient Peruvians called the Ravine of the Sun. In this solitary spot, shaded by beautiful and luxuriant vegetation, the travellers saw an isolated mass of sandstone, twelve or fifteen feet high. One side of this rock was remarkable for its whiteness: it was cut perpendicularly as if it had been worked by the hand of man. On this smooth white ground were several concentric circles, representing the image of the sun. They were of a blackish brown, and in the space they inclosed were features, half effaced, that indicated two eyes and a mouth. Examining these circles closely Humboldt found that they were small veins of iron ore, common in every formation of sandstone. The features indicating the eyes and mouth, which were evidently made by some metallic tool, were probably added by the Peruvian priests to impose upon the people. When the Spaniards conquered the country, it was to the interest of the missionaries to efface them, and it was accord-

ingly done. Humboldt saw traces of their chisels in all the circles.

The foot of the rock was cut into steps, which led to a seat, hollowed out on the top, and so placed that from the bottom of a hollow the image of the sun might be seen. The natives related that when the Inca Yupa-Yupangi advanced with his army to conquer the kingdom of Quito, then commanded by the conchocando of Lican, the priests who accompanied him discovered on the stone the image of the Divinity whose worship ought to be introduced among the conquered nations. The prince and his soldiers considered the discovery of the stone as a lucky augury, and it no doubt contributed the choice of the ground on which the Fortress of Cannar was built.

Near by was a chain of hills which was once a part of the garden belonging to the ancient fortress. Here, as at the ravine, the travellers found a number of small pathways cut in the slope of a rock, which was scarcely covered with vegetable mould. There was not a tree which seemed to have outlived fifty years. Nothing reminded them of the Incas, except a small monument of stone, placed on the edge of a precipice. At a distance it resembled a sofa, the back of which was decorated with a sort of arabesque, in the form of a chair. From this singular chair, in which but one person could sit at a time, there was a delightful prospect. Here, without doubt, the Incas used to sit and gaze over the surrounding country. Before them was the verdant valley, through which ran the river Gulan, broken into cascades, and foaming along through tufts of gunnera and melastomas: behind and around were the everlasting hills!

The travellers rested awhile at Loxa, and visited its cinchona woods which yielded quinine, or Peruvian bark. Peruvian bark was first brought into Europe in the middle of the seventeenth century, either, as Sebastian Badus asserts, to Alcala de Henares in 1632, or to Madrid in 1640, on the arrival of the wife of the Viceroy, the Countess of Chinchon, who had been cured of intermittent fever at Lima, accompanied by her physician, Juan del Vego. The trees which yielded the finest quality of quinine were found from eight to twelve miles to the south-east of Loxa, in the mountains of Uritusinga, Villonaco, and Rumisitana. They grew in dense woods, and aspired above the surrounding trees. Their leaves were five inches long and two broad, and of a peculiar reddish color. When the upper branches waved to and fro in the wind, their glittering could be seen at a great distance.

The quinine tree was cut down in its first flowering season, or in the fourth or seventh year of its age, according as it had sprung from a vigorous root-shoot, or from a seed. Humboldt learned, that at the period of his journey, according to official computations, only 11,000 lbs. of the bark were collected annually. None of this precious store found its way at that time into commerce; the whole was sent from the port of Payta on the Pacific, round Cape Horn to Cadiz, for the use of the Spanish Court. In order to furnish this small quantity eight or nine hundred trees were cut down every year. The older and thicker stems were already becoming scarce; but the luxuriance of vegetation was such that the younger trees, which supplied the demand, though only six inches in diameter, often attained the height of fifty or sixty feet.

Between the Indian villages of Ayavaca and Guancabamba the travellers found the ruins of the city of Chulucanas. These ruins were situated on a slope of the Cordilleras, near the brink of a river, from which they were separated by a wall. Two openings in this wall corresponded with the two principal streets of the city. The houses, built of porphyry, were distributed into eight quarters, formed by streets cutting each other at right angles. In the centre of these quarters, each of which contained twelve small habitations, were the remains of four large buildings of an oblong form, separated by four small square buildings, occupying the four corners. The hill on which the city stood was divided into six terraces, the platforms of which were faced with hewn stone. On the right of the river which bounded the city, they discovered an uncouth structure, evidently an ancient amphitheatre.

The region of country in which they were now travelling—a series of mountain wildernesses, was cold and stormy. They were often for days in a dense mist, or worse still, they endured the peltings of violent showers of hail, which cut their faces and hands. The vegetation had a peculiar character, from the absence of trees, the short close branches of the small-leaved myrtle-like shrubs, the large-sized and numerous blossoms, and the perpetual freshness of the whole from the constant and abundant supply of moisture.

At various points in their journey they came upon the remains of the old road of the Incas. The finest portions of these roads were at Chulucanas, and in the neighbourhood of Ingatambo, at Pomahuaca. It was nine thousand seven hundred feet lower at the latter place than at Assuay.

They found placed at nearly equal distances apart, stations consisting of dwelling-houses built of well-cut stone. These stations were a kind of caravanserai, and were called Tambos, and Inca-houses. Some were surrounded by a kind of fortification; others were constructed for baths with arrangements for conducting hot water. The largest of them were designed for the use of the family of the Monarch himself.

There were two great artificial Peruvian paved roads or systems of roads, covered with flat stones, or sometimes even with cemented gravel. One passed through the wide and arid plain between the Pacific Ocean and the chain of the Andes, and the other over the ridges of the Cordilleras. Mile-stones, or stones marking the distances, were often found at regular intervals. The road was conducted across rivers and deep ravines by bridges of stone, wood, and rope. Both systems of roads were directed to the central point, Cuzco, the seat of government of the great empire. As the Peruvians employed no wheel carriages, and the roads were consequently only designed for the march of troops, for men carrying burdens, and for lightly-laden lamas, Humboldt and Bonpland found them occasionally interrupted, on account of the steepness of the mountains, by long flights of steps, provided with resting-places at suitable intervals. Francisco Pizarro and Diego Almagro, who on their distant expeditions used the military roads of the Incas with so much advantage, found great difficulties for the Spanish Cavalry at the places where these steps occurred. The impediment presented to their march on these occasions was so much the greater, because in the early times of the Conquista, the Spaniards

used only horses instead of the carefully treading mule, who in the difficult parts of the mountains seems to deliberate on every step he takes. It was not until a later period that mules were employed.

Sarmiento, who saw the Roads of the Incas while they were still in a perfect state of preservation, asks in a Relacion which long lay unread, buried in the Library of the Escorial, "how a nation unacquainted with the use of iron could have completed such grand works in so high and rocky a region, extending from Cuzco to Quito on the one hand, and to the coast of Chili on the other? The Emperor Charles," he adds, "with all his power could not accomplish even a part of what the well-ordered Government of the Incas effected through the obedient people over whom they ruled." Hernando Pizarro, the most educated and civilized of the three brothers, who for his misdeeds suffered a twenty years' imprisonment at Medina del Campo, and died at last at a hundred years of age in the odour of sanctity, exclaims: "In the whole of Christendom there are nowhere such fine roads as those which we here admire." The two important capitals and seats of government of the Incas, Cuzco and Quito, are one thousand English geographical miles apart in a straight line, without reckoning the many windings of the way; and including the windings, the distance is estimated by Garcilaso de la Vega and other Conquistadores at five hundred leagues. Notwithstanding the great distance, we learn from the well-confirmed testimony of the Licentiate Polo de Ondegardo, that Huayna Capac, whose father had conquered Quito, caused some of the building materials for the houses of the Incas in the latter city, to be brought from Cuzco.

When enterprising races inhabit a land where the form of the ground presents to them difficulties on a grand scale which they may encounter and overcome, this contest with nature becomes a means of increasing their strength and power as well as their courage. Under the despotic centralizing system of the Inca-rule, security and rapidity of communication, especially in the movement of troops, became an important necessity of government. Hence the construction of artificial roads on so grand a scale, and hence also the establishment of a highly improved postal system. Among nations in very different stages of cultivation we see the national activity display itself with peculiar predilection in some particular directions, but we can by no means determine the general state of culture of a people from the striking development of such particular and partial activity. Egyptians, Greeks, Etruscans, and Romans, Chinese, Japanese, and Hindoos, show many interesting contrasts in these respects. It is difficult to pronounce what length of time may have been required for the execution of the Peruvian roads. The great works in the northern part of the Empire of the Incas, in the highlands of Quito, must at all events have been completed in less than thirty or thirty-five years; *i. e.* within the short period intervening between the defeat of the Ruler of Quitu, and the death of Huayna Capac. But entire obscurity prevails as to the period of the formation of the Southern roads.

Notwithstanding the tribute of admiration which the first Conquistadores paid to the roads and aqueducts of the Peruvians, they not only neglected the repair and preservation of both these classes of useful works, but they even wantonly destroyed them; and this still more

towards the sea-coast, than on the ridges of the Andes, or in the deep-cleft valleys by which the mountain chain is intersected.

In their journey from the rocks of Zaulaca to the Valley of San Felipe, the travellers were obliged to wade through the Rio de Guancabamba, which flowed into the Amazon, no less than twenty-seven times, on account of the windings of the stream; while they continually saw near them, running in a straight line along the side of a steep precipice, the remains of the high built road of the Incas. The mountain torrent, though only from one hundred and twenty to one hundred and fifty feet broad, was so strong and rapid that, in fording it, their mules were often in danger of being swept away by the flood. As these mules carried their manuscripts, their dried plants, and all that they had been collecting for a year past, we can conceive the suspense with which they watched from the other side of the stream until the long train of eighteen or twenty beasts of burden had passed in safety.

The same river, in the lower part of its course, where it had many falls and rapids, was made to serve in a singular manner for the conveyance of correspondence with the coast of the Pacific. In order to expedite more quickly the few letters from Truxillo which were intended for the province of Jaen de Bracamoros, a swimming courier, as he was called in the country, was employed. This post messenger, who was usually a young Indian, swam in two days from Pomahuaca to Tomependa, first by the Rio de Chamaya, and then by the Amazon. He carefully placed the few letters entrusted to him in a large cotton handkerchief, which he wound round his head

in the manner of a turban. When he came to the waterfalls he left the river, and made a circuit through the woods. In order to lessen the fatigue of swimming for so long a time, he sometimes threw one arm round a piece of a very light kind of wood. Sometimes a friend went with him to bear him company. The pair had no concern about provisions, as they were always sure of a hospitable reception in any of the scattered huts, which were abundantly surrounded with fruit trees.

The Governor of the province of Jaen de Bracamoros assured Humboldt that letters carried by this singular water-post were rarely either wetted or lost. Soon after his return to Europe from Mexico, the traveller received, in Paris, letters from Tomependa, which had been sent in the manner above described. Several tribes of Indians, living on the banks of the Upper Amazon, made their journeys in a similar manner, swimming down the stream sociably in parties.

On approaching the hot climate of the basin of the Amazons, the eyes of the travellers were cheered by the aspect of a beautiful, and occasionally luxuriant vegetation. They had never before, not even in the Canaries, or on the hot sea coast of Cumana and Caraccas, seen finer orange trees than those of the Huertas de Pucara. Laden with many thousands of golden fruits, they attained a height of sixty feet; and, instead of rounded tops, had aspiring branches, almost like laurels or bay trees. The oranges of these trees were deliciously sweet, though the bitter, or Seville orange, was not wanting among them.

Not far from thence, near the Ford of Cavico, the travellers were surprised by an unexpected sight. They saw a grove of small trees, only about eighteen or nineteen

feet high, which, instead of green, had apparently red or rose-coloured leaves. It was a new species of Bougainvillæa, a genus first established by the elder Jussieu, from a Brazilian specimen in Commerson's herbarium. The trees were almost entirely without true leaves, as what were taken for leaves at a distance, proved to be thickly crowded bracteas. The appearance was altogether different, in the purity and freshness of the colour, from the autumnal tints which, in many of our forest trees, adorn the woods of the temperate zone at the season of the fall of the leaf.

They found at Chamaya rafts in readiness to convey them to Tomependa, which they desired to visit for the purpose of determining the difference of longitude between Quito and the mouth of the Chinchipe. They slept as usual under the open sky, on the sandy shore at the confluence of the Rio de Chamaya with the Amazons. The next day they embarked on the latter river, and descended it to the Cataracts and Narrows of Rentema, where rocks of coarse-grained sandstone rose like towers, and formed a rocky dam across the river. Humboldt measured a base line on the flat and sandy shore, and found that at Tomependa the afterwards mighty river of the Amazons was only a little above thirteen hundred and eighty-six feet across. In the celebrated River Narrow of Manscritche, between Santiago and San Borja, in a mountain ravine where at some points the overhanging rocks and the canopy of foliage forbade more than a feeble light to penetrate, and where all the drift wood, consisting of a countless number of trunks of trees, was broken and dashed in pieces, the breadth of the stream was less than one hundred and sixty feet. The

rocks by which all these Narrows were formed underwent many changes in the course of centuries. Thus a part of the rocks forming the Narrow of Rentema, had been broken up by a high flood a year before Humboldt's journey; and there had been preserved among the inhabitants, by tradition, a lively recollection of the precipitous fall of the then towering masses of rock along the whole of the Narrow—an event which took place in the early part of the eighteenth century. This fall, and the consequent blocking-up of the channel, arrested the flow of the stream; and the inhabitants of the village of Puaya, situated below the Narrow of Rentema, saw with alarm the wide river-bed entirely dry: but after a few hours the waters again forced their way. Earthquake movements were not supposed to have occasioned this remarkable occurrence. The powerful stream appeared to be incessantly engaged in improving its bed, and some idea of the force which it exerted may be formed from the circumstance, that notwithstanding its breadth it was sometimes so swollen as to rise more than twenty-six feet in the course of twenty or thirty hours.

The travellers remained for seventeen days in the hot valley of the Upper Amazons. Here Humboldt corrected and revised the chart of the Amazon made by Condamine, by sketching an accurate chart of this unknown portion of the great river, partly from his own observations, and partly from careful inquiries. This done they ascended the eastern declivity of the Cordilleras, and arrived at the argentiferous mountain of Gualgayoc, the principal site of the silver mines of Chota. Gualgayoc was an isolated mass of siliceous rock, traversed by a multitude of veins of silver which often in-

tersected, and terminating to the north and west by a deep and almost perpendicular precipice. The outline of the mountain was broken by numerous tower-like and pyramidal points. "Our mountain," said a rich possessor of mines to the travellers, "stands there like an enchanted castle." Gualgayoc reminded Humboldt of the serrated crest of the Monserrat Mountains in Catalonia, which he had visited before his departure for the New World. Besides being perforated to its summit by many hundred galleries driven in every direction, this mountain presented natural openings in the mass of the siliceous rock, through which the intensely dark blue sky of those elevated regions was visible to a spectator standing at the foot of the mountain. These openings were called windows—the windows of Gualgayoc. Similar windows were pointed out to the travellers in the walls of the Volcano of Pichincha, and called by a similar name,—the windows of Pichincha. The strangeness of the view was still farther increased by the numerous small sheds and dwelling-houses, which nestled on the side of the fortress-like mountain wherever a flat surface permitted their erection. The miners carried down the ore in baskets by very steep and dangerous paths to the places where the process of amalgamation was performed.

The travellers quartered themselves awhile near the mines in the small mountain town of Micuipampa, which was twelve thousand feet above the level of the sea, and where, though only 6° 43′ from the equator, water froze in the house nightly throughout a large portion of the year. In this desert devoid of vegetation lived three or four thousand persons, who were obliged to have all their means of subsistence brought from the warm valleys, as

they themselves only reared some kinds of kale and salad Here, as in every town in the high mountains of Peru, ennui led the richer class of persons to pass their time in gambling. They reminded Humboldt of the soldier of Pizarro's troop, who, after the pillage of the temple at Cuzco, complained that he had lost in one night at play "a great piece of the sun."

In a high plain not far from Micuipampa, there were found throughout an area of above a square mile, immediately under the turf, and as it were intertwined with the roots of the alpine grasses, enormous masses of rich red silver ore, and threads of pure silver. Another elevated plain near the Quebrada de Chiquera, was called the Field of Shells. The name referred to fossils which belonged to the cretaceous group, and which were found there in such abundance that they early attracted the attention of the natives. In this place there was obtained near the surface a mass of pure gold, spun round with threads of silver in the richest manner.

The path by which the travellers journeyed from Micuipampa to Caxamarca was difficult even for mules. Their way lay over a succession of Paramos, where they were exposed almost incessantly to the fury of the wind, and to the sharp-edged hail so peculiar to the ridges of the Andes. The height of the route above the level of the sea was generally between nine and ten thousand feet.

Reaching at length the last of these mountain wildernesses, they looked down with increased pleasure on the fertile valley of Caxamarca. It afforded a charming prospect: a small river wound through the elevated plain, which was of an oval form and about a hundred

square miles in extent. The plain resembled that of Bogota: both were probably the bottoms of ancient lakes But at Caxamarca there was wanting the myth of the wonder-working Bochica, who opened for the waters a passage through the rock of Tequendama. Caxamarca was situated six hundred and forty feet higher than Bogota—almost as high as the city of Quito; but being sheltered by surrounding mountains it enjoyed a far milder and more agreeable climate. The soil was extremely fertile, and the plain full of cultivated fields and gardens traversed by avenues of willows, large flowered red, white, and yellow varieties of Datura, Mimosas, and beautiful Quinuar-trees. Wheat yielded on an average in the Pampa de Caxamarca fifteen to twentyfold, but the hopes of a plentiful harvest were sometimes disappointed by night frosts, occasioned by the great radiation of heat towards the unclouded sky through the dry and rarefied mountain air; these frosts were not felt in the roofed houses.

In the northern part of the plain, small porphyritic domes broke through the widely extended sandstone strata, and probably once formed islands in the ancient lake before its waters had flowed off. On the summit of one of these domes, the Cerro de Santa Polonia, the travellers enjoyed a beautiful prospect. The ancient residence of Atahuallpa was surrounded on this side by fruit gardens and by irrigated fields of lucerne. Columns of smoke were seen at a distance rising from the warm baths of Pultamarca, which were still called the Baths of the Inca. Atahuallpa spent a part of the year at these baths, where some slight remains of his palace still survived the devastating rage of the Conquistadores.

A large and deep basin in which, according to tradition, one of the golden chairs in which the Inca was carried had been sunk, and has ever since been sought in vain, appeared to Humboldt, from the regularity of its circular shape, to have been artificially excavated in the rock above one of the fissures through which the springs issued.

Of the fort and palace of Atahuallpa there were only very slight remains in the town, which was adorned with some fine churches. The destruction of the ancient buildings was hastened by the devouring thirst of gold which led men, before the close of the sixteenth century, in digging for supposed hidden treasures, to overturn walls and carelessly to undermine or weaken the foundations of all the houses. The palace of the Inca was situated on a hill of porphyry which had originally been hollowed at the surface, so that it surrounded the principal dwelling almost like a wall or rampart. A state prison and a municipal building had been erected on a part of the ruins. The most considerable ruins still visible, but which were only from thirteen to sixteen feet high, were opposite the convent of San Francisco; they consisted of fine-cut blocks of stone two or three feet long, and placed upon each other without cement, as in the fortress of Cannar.

There was a shaft sunk in the porphyritic rock which once led into subterranean chambers, and a gallery said to extend to the other porphyritic dome before spoken of. Such arrangements showed an apprehension of the uncertainties of war, and the desire to secure the means of escape. The burying of treasures was an old and very generally prevailing Peruvian custom. Subter-

ranean chambers were often found below many of the private dwellings of Caxamarca.

The travellers were shown steps cut in the rock, and also what was called the Inca's foot-bath. The washing of the monarch's feet was accompanied by some inconvenient usages of court etiquette. Minor buildings, designed according to tradition for the servants, were constructed partly like the others of cut stones, and provided with sloped roofs, and partly with well formed bricks alternating with siliceous cement. In the latter class of constructions there were vaulted recesses, the antiquity of which Humboldt long doubted, but, as he afterwards believed, without sufficient grounds.

In the principal building the room was still shown in which the unhappy Atahuallpa was kept a prisoner for nine months from November, 1532, and there was pointed out the wall on which the captive signified to what height he would fill the room with gold, if set free. This height is given variously, by Xerez in his "Conquista del Peru" which Barcia has preserved for us, by Hernando Pizarro in his letters, and by other writers of the period. The prince said that "gold in bars, plates, and vessels, should be heaped up as high as he could reach with his hand." Xerez assigns to the room a length of twenty-three feet, and a breadth of eighteen feet. Garcilaso de la Vega, who quitted Peru in his twentieth year, in 1560, estimates the value of the treasure collected from the temples of the sun at Cuzco, Huaylas, Huamachuco, and Pachacamac, up to the fateful 29th of August, 1553, on which day the Inca was put to death, at three million, eight hundred and thirty-eight thousand Ducados de Oro,—not far from fifteen millions of dollars.

In the chapel of the state prison the stone was shown still marked by the indelible stains of blood. It was a thin slab, thirteen feet long, placed in front of the altar, and had probably been taken from the porphyry or trachyte of the vicinity. Humboldt was not permitted to make a precise examination by striking off a part of the stone, but the three or four supposed blood spots appeared to him to be natural collections of hornblende, or pyroxide in the rock. The Licentiate Fernando Montesinos, who visited Peru scarcely a hundred years after the taking of Caxamarca, even at that early period gave currency to the fable that Atahuallpa was beheaded in prison, and that stains of blood were still visible on the stone on which the execution had taken place. There is no reason however to doubt the fact, confirmed by many eye-witnesses, that the Inca, to avoid being burnt alive, consented to be baptized under the name of Juan de Atahuallpa, by his fanatic persecutor, the Dominican monk Vicente de Valverde. He was put to death by strangulation, publicly, and in the open air. Another tradition relates that a chapel was raised over the spot where Atahuallpa was garroted, and that his body rests beneath the stone; in such case, the supposed spots of blood would remain entirely unaccounted for. In reality, however, the corpse was never placed beneath the stone in question. After a mass for the dead, and solemn funereal rites, at which the brothers Pizarro were present in mourning habits, it was conveyed first to the churchyard of the convent of San Francisco, and afterwards to Quito, Atahuallpa's birthplace. This last transfer was in compliance with the expressed wish of the dying Inca. His personal enemy, the astute Ruminnavi,

from political motives, caused the body to be buried at Quito, with solemn obsequies.

Humboldt found descendants of the monarch, the family of the Indian Cacique Astorpilco, dwelling in Caxamarca, among the melancholy ruins of ancient departed splendour, and living in great poverty and privation; but patient and uncomplaining. The son of Cacique Astorpilco, a pleasing and friendly youth of seventeen, who accompanied Humboldt over the ruins of the palace of his ancestor, while living in extreme poverty, had filled his imagination with images of buried splendour and golden treasures hidden beneath the masses of rubbish upon which they trod. He related to the traveller that one of his more immediate forefathers had bound his wife's eyes, and then conducted her through many labyrinths cut in the rock into the subterranean garden of the Incas. There she saw, skilfully and elaborately imitated, and formed of the purest gold, artificial trees, with leaves and fruit, and birds sitting on the branches; and there too was the much sought for golden travelling chair of Atahuallpa. The man commanded his wife not to touch any of these enchanted riches, because the long foretold period of the restoration of the empire had not yet arrived, and that whoever should attempt before that time to appropriate any of them would die that very night. These golden dreams and fancies of the youth were founded on recollections and traditions of former days. These artificial golden gardens were often described by actual eye-witnesses, Cieza de Leon Sarmiento, Garcilaso, and other early historians of the Conquest. They were found beneath the Temple of the Sun at Cuzco, in Caxamarca, and in the

pleasant valley of Yucay, a favourite residence of the monarch's family. Where the golden gardens were not below ground, living plants grew by the side of the artificial ones; among the latter, tall plants and ears of maize were mentioned as particularly well executed.

The morbid confidence with which the young Astorpilco assured Humboldt that below their feet, a little to the right of the spot on which Humboldt stood at the moment, there was an artificial large-flowered Datura tree, formed of gold wire and gold plates, which spread its branches over the Inca's chair, impressed him painfully, for it seemed as if those illusive and baseless visions were cherished as consolations in present sufferings. He asked the lad: "Since you and your parents believe so firmly in the existence of this garden, are not you sometimes tempted in your necessities to dig in search of treasures so close at hand?" The boy's answer was so simple, and expressed so fully the quiet resignation characteristic of the aborginal inhabitants of the country, that Humboldt noted it down in his journal. "Such a desire does not come to us; father says it would be sinful. If we had the golden branches with all their golden fruits, our white neighbours would hate and injure us. We have a small field and good wheat."

Quitting Caxamarca, the travellers descended into the valley of the Magdalena, the outlet to which lay over the mountain pass of Guangamarca. A longing desire now seized them to behold the sea, which they had not seen for eighteen mouths. In looking from the summits of the volcanos near Quito, no sea horizon could be clearly distinguished, by reason of the too great distance of the coast and the height of the station: it was like looking

down from an air-balloon into vacancy. Subsequently when between Loxa and Guancabamba they reached the Paramo de Guamini, from whence the mule-drivers had confidently assured them that they should see beyond the plain, beyond the low districts of Piura and Lambajeque, the sea itself, which they so much desired to behold, a thick mist covered both the plain and the distant sea shore. They saw only variously shaped masses of rock alternately rise like islands above the waving sea of mist, and again disappear. They were now exposed to almost the same disappointment. As they toiled up the mighty mountain side, with their expectations continually on the stretch, their guides, who were not very well acquainted with the road, repeatedly promised them that at the end of the hour's march their hopes would be realized. The stratum of mist which enveloped them appeared occasionally to be about to disperse, but at such moments their field of view was again restricted by intervening heights.

"The desire which we feel," says Humboldt, "to behold certain objects does not depend solely on their grandeur, their beauty, or their importance; it is interwoven in each individual with many accidental impressions of his youth, with early predilection for particular occupations, with an attachment to the remote and distant, and with the love of an active and varied life. The previous improbability of the fulfilment of a wish gives besides to its realization a peculiar kind of charm. The traveller enjoys by anticipation the first sight of the constellation of the cross, and of the Magellanic clouds circling round the Southern Pole; of the snow of the Chimborazo, and the column of smoke ascending from

the volcano of Quito; of the first grove of tree-ferns, and of the Pacific Ocean. The days on which such wishes are realized form epochs in life, and produce ineffaceable impressions; exciting feelings of which the vividness seeks not justification by processes of reasoning." With the longing which Humboldt felt for the first view of the Pacific from the crests of the Andes, there mingled the interest with which he had listened as a boy to the narrative of the adventurous expedition of Vasco Nuñez de Balboa, the fortunate man who, followed by Francisco Pizarro, first among Europeans beheld from the heights of Quarequa, on the Isthmus of Panama, the eastern part of the Pacific Ocean.

When, after many undulations of the ground, on the summit of the steep mountain ridge, the travellers finally reached the highest point, the Alto de Guangamarca, the heavens which had been long veiled became suddenly clear: a sharp west wind dispersed the mist, and the deep blue of the sky in the thin mountain air appeared between narrow lines of the highest cirrhous clouds. The whole of the western declivity of the Cordillera by Chorillos and Cascas, covered with large blocks of quartz, and the plains of Chala and Molinos as far as the sea shore near Truxillo, lay beneath their eyes in astonishing apparent proximity. They now saw for the first time the Pacific Ocean itself; and they saw it clearly, forming along the line of the shore a large mass from which the light shone reflected, and rising in its immensity to the well-defined horizon.

They reached Truxillo, from whence they proceeded southward along the sandy tracts that bordered the Pacific, till they came to Lima. Near Truxillo Humboldt

visited the ruins of the ancient city of Chimu, and descended into the tomb of a Peruvian prince, in which Garci Gutierez de Toledo, while digging a gallery, in 1576, discovered a mass of gold amounting in value to more than a million of dollars. They remained some time at Lima and Callao, Bonpland botanizing, and Humboldt studying the influence of the climate, and making astronomical observations. They were fortunate enough while at Lima to observe the transit of Mercury over the sun's disk, which enabled Humboldt to determine the exact latitude of the city.

Towards the end of December, 1802, or at the beginning of January, 1803, they departed for Mexico, sailing for Acapulco in the Spanish frigate, Atalanta. They touched at Guayaquil on their way, and remained there several days. Here they heard from their inaccessible old friend, Cotopaxi, although they were at least one hundred and fifty miles from him. After a long period of rest the volcano had suddenly burst into violent eruption, and was discharging its terrible artillery. They heard it day and night. After a few hasty preparations they started inland, fired with the determination to revisit the volcano: but before they had gone far they were recalled by the news, that the frigate was obliged to set sail immediately. They were soon at sea again, standing away to the north and west for Acapulco. They landed in Mexico on the 23d of March, 1803.

CHAPTER VII.

MEXICO.

THE letters with which Don Mariano de Urquizo had furnished Humboldt before leaving Spain, introduced him at Acapulco, and throughout Mexico, as they had already done in South America, to the highest government officials. We accordingly find him three days after his arrival at the house of the contador, Don Baltasar Alvarez Ordono, taking observations to ascertain the latitude and longitude of the town. Except in a scientific point of view Acapulco had little to attract him. It stood on the southern shore of Mexico, on the recess of a bay, near a chain of granitic mountains. On a hill commanding the town and the entrance to the harbour, stood the castle or fortress of San Diego. The harbour was shut in by mountains. It had two entrances formed by the island of Roquetta; one a quarter of a mile wide, the other a mile and a half. This was the extent of its picturesqueness.

From Acapulco, in the beginning of April, the travellers proceeded to the capital, passing the plains of Chilpantzingo, rich in wheat fields, and the little town of Tasco, famous for its beautiful church. They stopped at Cuernavaca on the southern declivity of the Cordillera of Guchilaque, to rectify the longitude, which was incor-

rect on the common maps. Not far from Cuernavaca was the monument of Xochicalco, an isolated pile three hundred and fifty feet high. It was a mass of rocks to which the hands of man had given a regular conic form. It was divided into five stories, or terraces, each of which was at least sixty feet high, but narrowed towards the top. The hill was surrounded with a deep and broad ditch; the whole encampment was nearly twelve thousand feet in circumference. The summit, which was an oblong platform, two hundred and thirty feet from north to south, and three hundred feet from east to west, was encircled by a wall of hewn stone six or eight feet high. Within this wall stood the remains of a pyramidal monument. It was originally five stories high, but only the first story remained; for the owners of a neighbouring sugar-house had demolished the rest, and used the stones to build their ovens. There was no vestige of a staircase leading to the top of the pyramid, where, it was said, there was once a stone seat, ornamented with hieroglyphics. The stones of the pyramid were beautifully cut and polished, and decorated with reliefs. As each of these reliefs occupied several stones, and as they were interrupted by the joints, they must have been sculptured after the edifice was finished. Among the hieroglyphical ornaments were heads of crocodiles spouting water, and figures of men sitting cross-legged, after the manner of some Asiatic nations. As the building was on a plain four thousand feet above the sea, and crocodiles haunted only the rivers near the coast, it was strange that the architect should have sculptured them, instead of the plants and animals that belong to mountainous countries.

This artificial mountain, or pyramid, was probably a fortified temple, which originally contained an arsenal, and served in war as a fort. The Indians of the neighbourhood showed an ancient map, drawn before the arrival of the Spaniards, in which, where this monument should have been, there was a rude sketch of two warriors fighting with clubs. And about thirty years before the arrival of Humboldt and Bonpland, an isolated stone was found near by, with a relief of an eagle tearing a captive.

It was in the capital, however, which they soon reached, that the travellers found the greatest number of ruins. In fact the city of Mexico was based on ruins —the wrecks of the ancient capital, Tenochtitlan. Under the Great Square were fragments of the spacious temple of Mexitli. Behind the Cathedral was the palace of the king of Axajacatl, where Montezuma lodged the Spaniards on their arrival; and opposite the Viceroy's palace stood formerly the palace of Montezuma himself. These things had a great influence over the imaginative travellers; but their first object, after finding a residence, and delivering their letters, was to inquire for a new set of scientific instruments, in order to pursue their studies. They were not content to run through the country like ordinary travellers, chronicling their journey by a list of the inns at which they stopped: nor yet like artists or poets, alive to the charm of beautiful scenery and strange traditions. They were poets, artists, travellers, it is true: but they were something more. They were men of science, philosophers, *savans*, whose business and pleasure it was, to understand what they saw. They would read, or at least would try to, every page in the

great World-Book; not skipping any, because they were common, or tedious, but reading all.

They found in Mexico a School of Mines, like the Mineralogical Academy of Freyberg, (the director, by the way, was a pupil of Humboldt's old teacher, Werner) a Botanic Garden, and an Academy of Painting and Sculpture. The last bore the title of *Academia de los Nobles Artes de Mexico.* It owed its existence to the patriotism of several private citizens, and the protection of the minister, Galvez. The government had assigned it a spacious building, which was enriched by a finer and more complete collection of casts, than was at that time to be found in any part of Germany. Humboldt was surprised and delighted when he saw the Apollo Belvidere and the Laocoon. There were no fees for entrance at the Academy: it was free to all, even mulattoes and Indians. The rooms were lighted every evening with Argand lamps, and filled with hundreds of young people, who drew from reliefs, or living models, or copied drawings of furniture, chandeliers, or ornaments in bronze. The director of the class of sculpture, Don Manuel Tolsa, had just completed a bronze equestrian statue of Charles IV., the then reigning king of Spain. Humboldt was present when it was cast, and saw it moved to the Great Square—a five days' task. As the buildings around the Square were not lofty it looked admirably on its pedestal, standing grandly out from its blue background of sky.

This royal statue, the Viceroy's palace, and above all the new Cathedral with its massive towers, made the Great Square an imposing place. Humboldt did it full justice, we have no doubt, for his tastes like his powers were

universal, but we suspect it interested him more for what it had been, than what it was—more for what was under it, than what was above and around it. Below it, as we have already remarked, were the remains of the great temple of Mexitli, fragments of which were frequently brought to light. A few years before his arrival, (in August 1790) some workmen who were employed there in making excavations, in order to build a subterraneous aqueduct, discovered a great Aztec Idol of basaltic porphyry. It was about twenty feet high, and six or seven feet broad, and was sculptured on every side. At first it appeared an almost shapeless mass, but on being examined closely, upon the upper part was found the united heads of two monsters. The eyes were large, and in each mouth were four hideous teeth. The arms and feet were hidden under a drapery surrounded by enormous serpents; the ancient Mexicans called this drapery the Garment of Serpents. All these accessories, especially the fringes, which were in the form of feathers, were sculptured with the greatest care. This double idol probably represented Huitzilpochtle, the Aztec God of War, and his wife, Teoyamiqui, who conducted the souls of the warriors who died in the defence of the gods, to the House of the Sun, where she transformed them into humming-birds. Her bosom was surrounded with deaths'-heads and mutilated hands, symbols of the sacrifices which were celebrated in honour of this horrible pair. The hands alternated with the figures of vases, in which incense was burnt. As the idol was sculptured on every side it was doubtless supported in the air on two columns, between which the priests dragged their victims to the altar of the temple beyond. Upon the under side of the

idol was a representation of Michlanteuhtli, the lord of the place of the dead. It was a fitting roof to that terrible portal of death.

The viceroy, Count Revillagigedo, transported it to the University of Mexico; but the professors of the University were unwilling to expose it to the sight of the Mexican youth, so they buried it anew, in one of the passages of the college. At Humboldt's solicitation the Bishop of Monteray, who was passing through the capital on his way to his diocese, persuaded the rector to unbury it, which gave the traveller an opportunity of sketching it.

Humboldt was shown another idol at the house of Senor Dupé, one of his Mexican friends. It represented a sitting, or rather squatting woman. She had no hands, but where they should have been were the toes of her feet. This statue was remarkable for its head-dress, which resembled the veils sculptured on the heads of Isis and the Sphynxes. The forehead was ornamented with a string of pearls on the edge of a narrow fillet: the neck was covered with a three-cornered handkerchief, to which hung twenty-two little balls or tassels. These tassels and the head-dress generally, reminded Humboldt of the apples and pomegranates on the robes of the Jewish High Priests. This strange figure was called the statue of an Aztec priestess, but Humboldt thought it a representation of some of the Mexican divinities. It was probably one of the old household gods.

Besides this statue he saw the great Monument of the Calendar, and the Stone of Sacrifice, adorned in relief with the triumphs of some old Aztec king, both of which were dug up in the Great Square. He also visited the

archives of the Viceroyalty, and pored over its hoard of Aztec manuscripts. These hieroglyphs were written either on agave paper, or on stag-skins. They were frequently from sixty-five to seventy feet in length, and each page contained from two to three feet of surface They were folded here and there in the form of a rhomb, and thin wooden boards fastened to the extremities formed their binding, and gave them a resemblance to our volumes in quarto. No nation of the old continent ever made such an extensive use of hieroglyphical writing as the Aztecs, and in none of them were real books bound in this way. Humboldt procured several fragments of similar manuscripts during his stay in Mexico.

But mysterious manuscripts which he could not read, and uncouth idols with which he could have no sympathy, were soon laid aside for the great Book of Nature, and the thousands of men around him. One of his favourite haunts was the famous hill of Chapoltepec. From the centre of this solitude his eye swept over a vast plain of cultivated fields which extended to the feet of the distant mountains covered with perpetual snow. Below him were old cypress trunks fifty feet in circumference, and off to the east the city. It appeared as if washed by the waters of the lake of Tezcuco, whose basin, surrounded with villages and hamlets, brought to his mind the most beautiful lakes of the mountains of Switzerland. Large avenues of elms and poplars led to it in every direction; and two aqueducts, constructed over arches of great elevation, crossed the plain like walls. The magnificent convent of Our Lady of Guadalupe appeared joined to the mountains of Tepeyacac, among ravines, which sheltered date and yucca trees. Towards the

south was the tract between San Angel, Tacabaya, and San Augustin de las Cuevas, an immense garden of orange, peach, apple, and cherry trees. This beautiful cultivation formed a singular contrast with the wild appearance of the naked mountains which enclosed the valley, among which were the famous volcanoes of La Puebla, Popocatepetl, and Iztaccihuatl. And around and overhead, steeped in sunshine, was the deep blue tropic sky.

Sometimes in the morning Humboldt went to the market-place and watched the Indian hucksters, entrenched in verdure. No matter what they sold, fruit, roots, or pulque, their shops were ornamented with flowers. A hedge, a yard high, made of fresh herbs and delicate leaves, surrounded like a semicircular wall the fruits offered to public sale. The bottom of the market, which was smooth and green, was divided by garlands of flowers, which ran parallel to one another. Small nosegays placed symmetrically between the festoons, gave this enclosure the appearance of a carpet strewn with flowers. Humboldt was struck with the way in which the natives displayed their fruit in small cages of light wood. They filled the bottom of these cages with raisins and pears, and ornamented the top with the most odorous flowers. Without doubt this art of entwining fruits and flowers had its origin in that happy period when, long before the introduction of inhuman rites, the first inhabitants of Anahuac offered up to the great spirit Teotl the first fruits of their harvest.

But the prettiest sight was to see at sunrise the Indians with their boats loaded with fruits and flowers, descending the canals of Iztacalco and Chalco. The greater part of their fruits and roots were cultivated on

floating gardens. There were two sorts of these gardens, one which was movable, and driven about by the winds, the other fixed and fastened to the shore. The ingenious invention of floating gardens appears to go back to the end of the fourteenth century. It had its origin in the extraordinary situation of a people surrounded with enemies, and compelled to live in the midst of a lake little abounding in fish, who were forced to fall upon every means of procuring subsistence. It is even probable that Nature herself suggested to the Aztecs the first idea of floating gardens. On the marshy banks of the lakes of Xochimilco and Chalco, the agitated water in the time of the great rises carries away pieces of earth covered with herbs, and bound together by roots. These, floating about for a long time as they are driven by the wind, sometimes unite into small islands. A tribe of men, too weak to defend themselves on the continent, would take advantage of these portions of ground which accident put within their reach, and of which no enemy disputed the property. The oldest floating gardens were merely bits of ground joined together artificially, and dug and sown upon by the Aztecs. Similar floating islands are to be met with in all the zones. Humboldt saw them on the river Guayaquil, twenty-five or thirty feet long.

Apropos of the markets of Mexico. Here is a passage from a letter of Cortez to the Emperor Charles V., which gives a description of the valley of Mexico, and the old city of Tenochtitlan, markets included. It is dated the 30th October, 1530, nearly three hundred years before the visit of Humboldt:

"The province in which the residence of this great

lord Muteczuma is situated, is circularly surrounded with elevated mountains, and intersected with precipices The plain contains near seventy leagues in circumference, and in this plain are two lakes which fill nearly the whole valley; for the inhabitants sail in canoes for more than fifty leagues round. Of the two great lakes of the valley of Mexico, the one is fresh and the other salt water. They are separated by a small range of mountains. These mountains rise in the middle of the plain, and the waters of the lakes mingle together in a strait between the hills and the high Cordillera. The numerous towns and villages constructed in both of the two lakes carry on their commerce by canoes, without touching the continent. The great city of Temixtitan is situated in the midst of the salt-water lake, which has its tides like the sea; and from the city to the continent there are two leagues whichever way we wish to enter. Four dikes lead to the city; they are made by the hand of man, and are of the breadth of two lances. The city is as large as Seville or Cordova. The streets, I merely speak of the principal ones, are very narrow and very large; some are half dry and half occupied by navigable canals, furnished with very well constructed wooden bridges, broad enough for ten men on horseback to pass at the same time. The market-place, twice as large as that of Seville, is surrounded with an immense portico, under which are exposed for sale all sorts of merchandise, eatables, ornaments made of gold, silver, lead, pewter, precious stones, bones, shells, and feathers, delf ware, leather, and spun cotton. We find hewn stone, tiles, and timber fit for building. There are lanes for game, others for roots and garden fruits; there are houses where bar-

bers shave the head, with razors made of obsidian; and there are houses resembling our apothecary shops, where prepared medicines, unguents, and plasters are sold. There are houses where drink is sold. The market abounds with so many things, that I am unable to name them all to your highness. To avoid confusion, every species of merchandise is sold in a separate lane; everything is sold by the yard, but nothing has hitherto been seen to be weighed in the market. In the midst of the great square is a house which I shall call the Audiencia, in which ten or twelve persons sit constantly for determining any disputes which may arise respecting the sale of goods. There are other persons who mix continually with the crowd, to see that a just price is asked. We have seen them break the small measures which they had seized from the merchants."

In one of their excursions from the city the travellers visited the pyramids of Teotihuacan. These pyramids stood in a plain that bore the name of the Path of the Dead. Surrounded by several hundreds of smaller edifices which formed streets, in exact lines from north to south, and from east to west, rose two great pyramids which the Indians called Tonatiuh Ytzaqual, and Metzli Ytzaqual, or the Houses of the Sun and Moon. The largest was one hundred and seventy-five feet in perpendicular height, the smallest one hundred and forty feet. Twenty-five or thirty feet was the average height of the lesser pyramids, which, according to the traditions of the Indians, were burial-places for the chiefs of the tribe. They were said to be dedicated to the stars.

The two great pyramids of Teotihuacan were divided into four principal terraces, which were subdivided into

steps. These steps were covered with fragments of obsidian, which were probably the edges of the instruments with which the Toltec and Aztec priests in their barbarous sacrifices, opened the chests of their human victims. The upper terrace was formerly crowned with colossal statues of the Sun and Moon. These statues were made of stone, and covered with plates of gold. Had they been stone merely, they might have remained there to this day, but being plated with gold they were sure to be spoiled by the first foreign invader. The soldiers of Cortez stripped off the gold at once, and Bishop Zumaraga, a Franciscan monk, who undertook to destroy whatever related to the worship, the history, and the antiquities of Mexico, completed the work of his militant followers, by demolishing the idols. The pyramids alone remained.

When Humboldt arrived in Mexico his astronomical instruments were sadly out of order, and thinking it would be impossible to replace them, he intended to remain only a few months, and then depart for Europe. But as Don Manuel del Rio, the director of the School of Mines, was able to lend him a new set, he remained a year, travelling in various parts of the country, and making observations.

Towards the end of April, or the beginning of May, he proceeded to the mines of Moran, and Real del Monte, which lay to the north-east of the capital. The road was covered with oaks, cypresses, and rose trees. He made several astronomical observations on his way, stopping for that purpose at the haciendas of Zumpango, Huchuetoca, and Tisayuca.

Long before the arrival of the Spaniards, the natives

of Mexico, as well as those of Peru, were acquainted with several metals. They were not contented with the metals which were found in their native state on the surface of the earth, and particularly in the beds of rivers, and ravines formed by the torrents: they applied themselves to subterranean operations in the working of veins; they cut galleries, and dug pits of communication and ventilation; and they had instruments for cutting the rocks. Cortez informs us in the historical account of his expedition, that gold, silver, copper, lead, and tin, were publicly sold in the great markets of Tenochtitlan. The inhabitants of Tzapoteca and Mixtecapan separated the gold by washing the alluvial lands. They usually paid their tributes in two ways, either by collecting in leathern sacks or small baskets of slender rushes, the grains of native gold, or by founding the metal into bars. These bars, like those now used in trade, are represented in the ancient Mexican paintings. In the time of Montezuma, the natives had begun to work the silver mines of Tlachco, in the province of Cohuixco, and those which run across the mountains of Zumpango. In all the great towns of Anahuac gold and silver vases were manufactured. The Spaniards on their first arrival at Tenochtitlan, could never cease admiring the ingenuity of the Mexican goldsmiths. When Montezuma, seduced by his credulity, recognised on the arrival of white and bearded men, the accomplishment of the mysterious prophecy of Quetzalcoatl and compelled the Aztec nobility to yield homage to the king of Spain, the quantity of precious metals offered to Cortez was one hundred and sixty-two thousand *pesos de oro*. "Besides the great mass of gold and silver," says the famous Conquestidor in his first letter

to the Emperor, Charles V., "I was presented with gold plate and jewels of such precious workmanship, that unwilling to allow them to be melted, I set apart more than a hundred thousand ducats worth of them to be presented to your Imperial Highness. These objects were of the greatest beauty, and I doubt if any other prince on earth ever possessed anything similar to them. That your Highness may not imagine I am advancing fables. I may add that all which the earth and ocean produces, of which king Montezuma could have any knowledge, he had caused to be imitated in gold and silver, in precious stones and feathers, and the whole in such great perfection, that we could not help believing that we saw the very objects represented. Although he gave me a great share of them for your Highness, I gave orders to the natives to execute several other works in gold, after my designs, which I furnished them with, such as images of saints, crucifixes, medals, and necklaces. As the fifth or eighth on the silver paid to your Highness amounted to more than a hundred marcs, I gave orders to the native goldsmiths to convert them into plate of various sizes, spoons, cups, and other vessels for drinking. All these works were imitated with the greatest exactness." When we read this passage, we cannot help believing that we are reading the account of a European ambassador, returned from China or Japan. Yet we can hardly accuse the Spanish General of exaggeration, when we consider that the Emperor Charles V. could judge with his own eyes the perfection or imperfection of the objects sent him.

Humboldt remained a couple of months at Moran and Real del Monte, inspecting the Mexican system of min-

ing. As might have been expected, it was in its infancy. It had not advanced since the sixteenth century, when it was first transplanted from Europe. The miners were not enterprising enough to adopt any of the modern improvements; they adhered tenaciously to the old way, which was notoriously crude and imperfect. They were better paid, however, Humboldt thought, than the miners of other countries; they earned from $5 to $6 a-week, while the wages of other labourers in Mexico did not exceed $1,50, or $1,75 for the same time. The miners were not remarkable for their honesty, for they made use of a thousand tricks to steal the rich minerals in which they worked. As they were nearly naked, and were searched on leaving the mines (not in the most delicate manner either), they tried to conceal small morsels of native silver, or red sulphuretted and muriated silver in their hair, under their arm-pits, in their mouths, and other out-of-the-way corners of their persons. Good or bad, all were searched alike, and a register was kept of the minerals found about them. In the mine of Valenciana, between 1774 and 1787, the sum stolen, but recovered, amounted to $180,000.

The working of the mines was long regarded as one of the principal causes of the depopulation of Mexico. Humboldt, however, did not consider the mortality among the miners much greater than among the other classes. This seemed to him remarkable from the temperature to which they were exposed. In one mine he found the thermometer at 93° at the bottom, a perpendicular depth of one thousand six hundred and eighty-one feet, while at the mouth of the pit, in the open air, the same thermometer sank in winter to 39°

above 0, a difference of 54° to which the miners were exposed.

The hardest part of the work was performed by the native Indians, who were the beasts of burden of the mines. They carried the metals out on their backs, in loads of from two hundred and fifty to three hundred and fifty pounds at a time, ascending and descending thousands of steps, of an inclination of forty-five degrees, where the air was from 71° to 73°. The mode of transportation was in bags, under which the Indians placed a woollen covering, for they were generally naked to the middle, to save themselves from being bruised and chafed. Humboldt met them in files of fifty or sixty; men of seventy years, and children of ten or twelve. They threw their bodies forward in ascending, and rested on staffs, which were generally not more than a foot in length. They walked in a zig-zag direction, because they had found from long experience that their respiration was less impeded when they traversed obliquely the currents of air which entered the pits from without. Great care was taken in controlling the minerals transported by them. The proprietors of the mines knew, within a few pounds, what went out daily. As the Indians were paid for what they carried, their loads were weighed before they left the mines.

The Indians of Mexico bore a general resemblance to those who inhabited the forests of North America, and the interior of Peru and Brazil. They had the same swarthy and copper colour, flat and smooth hair, small beard, squat body, long eyes, with the corners directed upwards towards the temples, prominent cheek bones, thick lips, and an expression of gentleness in the mouth,

strongly contrasted with a gloomy and severe look. They had a more swarthy complexion than the Indians which Humboldt and Bonpland saw in Peru, and more beard likewise. Almost all those that he saw in the neighbourhood of the capital wore small moustaches. They attained a pretty advanced age, in spite of their excessive drunkenness. This vice was most common among those who inhabited the valley in which the capital stood, and the environs of Puebla and Tlascala. The police of Mexico, when Humboldt was there, were in the habit of sending round tumbrils to collect the drunkards that were found stretched out in the streets. They were treated like dead bodies, and carried to the principal guard-house. The next morning an iron ring was put round their ancles, and they were made to clean the streets for three days; they were set free on the fourth day, but many of them were sure to be back again in the course of the week.

Travellers who merely judge from the physiognomy of the Indians are tempted to believe that it is rare to see old men among them. In fact, without consulting parish registers, which in warm regions are devoured by the ants every twenty or thirty years, it is very difficult to form any idea of the age of Indians: they themselves are completely ignorant of it. Their head never becomes gray. It is infinitely more rare to find an Indian than a negro with gray hairs, and the want of beard gives the former a continual air of youth. The skin of the Indians is also less subject to wrinkles. Humboldt often saw in Mexico, in the temperate zone half way up the Cordillera, natives, and especially women, a hundred years of age. This old age was generally comfortable·

for the Mexican and Peruvian Indians preserved their muscular strength to the last. While Humboldt was at Lima the Indian Hilario Pari died at the village of Chiguata, at the age of one hundred and forty-three. He remained united in marriage for ninety years to an Indian of the name of Andrea Alea Zar, who attained the age of one hundred and seventeen years. This old Peruvian went, at the age of one hundred and thirty, from three to four leagues daily on foot. He became blind thirteen years before his death, and of twelve children left behind him but one daughter, of seventy-seven years of age.

The copper-coloured Indians enjoy one great physical advantage, which is undoubtedly owing to the great simplicity in which their ancestors lived for thousands of years. They are subject to almost no deformity. Humboldt never saw a hunchbacked Indian; and it was extremely rare to see one who squinted, or was lame in the arm or leg. In the countries where the inhabitants suffer from the *goitre*, it never prevails among the Indians, and seldom among the Mulattoes.

The Indians of Mexico adhered to their ancient customs, manners, and opinions, especially their religious ones, with great obstinacy. The introduction of Christianity into the country had no other effect than the substituting of new ceremonies for the old—the symbols of a gentle and humane religion for the ceremonies of a sanguinary worship. They received from the hands of their conquerors new laws and new divinities: their vanquished gods appeared to them to yield to the gods of the strangers. In such a complicated mythology as that of the Mexicans, it was easy to find out an affinity between

the divinities of Aztlan and the divinity of the east. Cortez very artfully took advantage of a popular tradition, according to which the Spaniards were merely the descendants of king Quetzalcoatl, who left Mexico for countries situated in the east, to carry among them civilization and laws. The ritual books composed by the Indians in hieroglyphics at the beginning of the conquest, several fragments of which Humboldt procured while in Mexico, show that at that period Christianity was confounded with the Mexican mythology: the Holy Ghost is identified with the sacred eagle of the Aztecs. The missionaries not only tolerated, but even favoured to a certain extent, this amalgamation of ideas, by means of which the Christian worship was more easily introduced among the natives. They persuaded them that the gospel had, in very remote times, been already preached in America; and they investigated its traces in the Aztec ritual with the same ardour which the learned, who in our days engage in the study of the Sanscrit, display in discussing the analogy between the Greek mythology and that of the Ganges and the Barampooter.

The Indians knew nothing of religion beyond the exterior forms of worship. Fond of whatever was connected with a prescribed order of ceremonies, they found in the Christian religion particular enjoyments. The festivals of the church, the fireworks with which they were accompanied, the processions mingled with dances and whimsical disguises, were a most fertile source of amusement for them. In these festivals their national character was displayed in all its individuality. Everywhere the Christian rites assume the shades of the country where they have been transplanted. In the Philippine

and Mariana islands, the natives of the Malay race have incorporated them with the ceremonies which are peculiar to themselves; and in the province of Pasto, on the ridge of the Cordillera of the Andes, Humboldt saw Indians, masked and adorned with small tinkling bells, perform savage dances around the altar, while a monk of St. Francis elevated the host.

The Indians were fond of painting, and carving on wood or stone. Humboldt was astonished at what they were able to execute with a bad knife on the hardest wood. They were particularly fond of painting images, and carving statues of saints. They had been servilely imitating for three hundred years, the models which the Europeans imported with them at the conquest. This imitation was derived from a religious principle of a very remote origin. In Mexico, as in Hindostan, it was not allowable in the faithful to change the figure of their idols in the smallest degree. Whatever made a part of the Aztec or Hindoo ritual was subjected to immutable laws. The Christian images had preserved in Mexico a part of that stiffness and harshness of feature which characterized the hieroglyphical pictures of the age of Montezuma.

Returning from Moran and Real del Monte in July, Humboldt projected a visit to the mines of Guanaxuato. These celebrated mines, which were among the richest in the country, lay to the north of the capital. On his way thither he stopped to examine the canal of Huehuetoca.

From the valley of Tula, through which this great canal ran, he proceeded to the plain of Queretaro, passing the mountain of Calpulalpan, and the town of San

Juan del Rio, till he came to the city of Queretaro. He remained there a few days to make an astronomical observation, and started for Guanaxuato, stopping on his way at the mines of Sotolar, Juchitlan, Las Aguas, Maconi, El Doctor, and San Christobal.

The mine of Valenciana, the most celebrated of all the mines of Guanaxuato, and the richest in Mexico, although it had been worked by the Indians, and the early Spanish settlers, was not much wrought until towards the end of the eighteenth century. In 1760 a Spaniard, named Obregon, began to work a vein on a part of the old mine, which was till then believed to be destitute of metals. He was without fortune, but as he had the reputation of being a worthy man, he found friends, who from time to time advanced him small sums to carry on his operations. In 1766 the works were over two hundred and fifty feet deep, yet the expenses greatly surpassed the metallic produce. The next year he entered into partnership with a petty merchant of Rayas, named Otero, and in a short time the silver began to be more plentiful; as the pit grew deeper it grew richer. In 1771 they drew enormous masses of sulphuretted silver, mixed with native and red silver. From that time it yielded over $1,000,000 annually.

When Obregon, or as he was afterwards called, the Count of Valenciana, began to work the vein above the ravine of San Xavier, goats were feeding on the hill tops. Ten years after there was a town there containing seven or eight thousand inhabitants. At the time of Humboldt's visit the population of Guanaxuato was seventy thousand six hundred; twenty-nine thousand six hundred of the number were miners. He remained

there and in the neighbourhood two months, pursuing his scientific studies, now on the mountains making astronomical observations, and now in the mines, wresting from Nature the secret of her richest treasures.

We shall not pursue him in his various excursions among the mines, but give here the result of his observations on the mineral wealth of Mexico.

The quantity of silver annually extracted from the Mexican mines was ten times greater than was at that time furnished by all the mines in Europe; gold, however, was not more abundant than in Hungary or Transylvania. For the most part extracted from alluvial grounds by means of washing, it was occasionally found in veins on mountains of primitive rock. The mines of native gold were most plentiful in Oaxaca, in gneiss, or micaceous slate. This last rock was particularly rich in gold in the mine of Rio San Antonio. It was either found pure, or mixed with silver; there was scarcely a silver mine in Mexico that did not contain some gold. The principal vein in the mine of Santa Cruz, at Villalpando, was intersected by a great number of small rotten veins of exceeding richness. The argillaceous slime with which these veins were filled contained so great a quantity of gold disseminated in impalpable parcels, that the workmen were compelled to bathe themselves in large vessels when they left the mine, to prevent any of the auriferous clay from being carried off by them on their bodies.

Great quantities of silver were derived from ores, such as antimony, arsenical gray copper, sulphuretted silver, muriated silver, prismatic black silver, and red silver. Red silver constituted the greater part of the wealth of

Cosola, Zolaga, and Sombrete. The mine of la Veta Negra, near Sombrete, yielded in five or six months seventy thousand silver marcs; yet it was not one hundred feet deep. Black silver was common in the mines of Guanaxuato, Zacatecas, and Real del Monte. Muriated silver abounded in the mines of Catorce, and Cerro San Pedro. At Fresnillo it was frequently olive-green; superb samples of this colour were found in the mines of Vallorecas. The veins of Zimapan, a little to the north of Real del Monte, offered a great variety of curious minerals; among others chrysophrase, and a new species of opal of rare beauty. Humboldt procured one of these opals of great size, and carried it with him when he returned to Europe. The mineralogists Karsten and Klaproth described it as a fire-opal.

Of all the rock-formations in Mexico the porphyritic rocks were the richest in gold and silver; then came primitive slate, graywacke, and alpine limestone. Copper was found in the mines of Ingaram, and at San Juan Guetamo. Tin was sometimes obtained by washing the alluvial lands. Iron, too, was abundant.

From Guanaxuato Humboldt proceeded in a southerly direction to Salamanca. He stopped at Salamanca long enough to fix its latitude and longitude, and then continued his journey to Valladolid, the capital of the Intendancy of that name. Valladolid was a small city, containing only eighteen thousand inhabitants. Its elevation was six thousand four hundred feet above the sea, yet snow had been known to fall in its streets. It contained nothing worthy of notice, except an aqueduct, and a bishop's palace.

From Valladolid he proceeded to Pascuaro.

Pascuaro was situated on the picturesque banks of a little lake of the same name. This lake, and the scenery in its vicinity, Humboldt declared, would alone have repaid him for his voyage across the ocean. The city or town of Pascuaro contained the ashes of a remarkable man, Vasco de Quiroga, the first bishop of Mechoacan. He was the benefactor of the Indians in his diocese, whose industry he encouraged, prescribing one particular branch of trade to each village. He died in 1556; but even in Humboldt's time his memory was venerated by the Indians, who continued to call him their father.

The Indians of the province of Valladolid formed three races of different origin, the Tarascs, celebrated in the sixteenth century for the gentleness of their manners, for their industry in the mechanical arts, and for the harmony of their language, abounding in vowels; the Otomites, a tribe far behind them in civilization, who spoke a language full of nasal and guttural aspirations; and the Chichimecs, who had preserved the Mexican language. All the south part of the Intendancy of Valladolid was inhabited by Indians. In the villages, the only white figure to be met with was the *curé*, and he also was frequently an Indian, or Mulatto. The benefices were so poor there, that the bishop of Mechoacan had the greatest difficulty in procuring ecclesiastics to settle in a country where Spanish was almost never spoken, and where along the coast of the Great Ocean, the priests, infected by the contagious miasmata of malignant fevers, frequently died before the expiration of seven or eight months.

But the wonder of the Intendancy of Valladolid, and indeed of Mexico itself, was the remarkable volcano of

Jorullo, which lay a little to the south of Pascuaro. The great catastrophe in which this mountain rose from the earth, and by which a considerable extent of ground totally changed its appearance, is one of the most extraordinary physical revolutions in the history of our planet. Geology points out the parts of the ocean, where, at recent epochs, within the last two thousand years, near the Azores, in the Ægean sea, and to the south of Iceland, small volcanic islands have risen above the surface of the water; but it gives us no example of the formation, from the centre of a thousand small burning cones, of a mountain of scoriæ and ashes one thousand seven hundred feet in height, comparing it only with the level of the old adjoining plains, in the interior of a continent, thirty-six leagues distant from the coast, and more than forty-two leagues from every other active volcano. This remarkable phenomenon was sung in hexameter verses by the Jesuit Father Raphael Landivar, a native of Guatimala. It is mentioned by the Abbé Clavigero in the ancient history of his country; and yet, till Humboldt visited and described it, it remained unknown to the mineralogists and naturalists of Europe, though it took place not more than fifty years before, and within six days' journey of the capital of Mexico.

A vast plain extended from the hills of Aguasarco to near the villages of Teipa and Petatlan, both equally celebrated for their fine plantations of cotton. This plain was at the most not over two thousand six hundred feet above the level of the sea. In the middle of a tract of ground in which porphyry, with a base of grünstein predominated, basaltic cones appeared, the summits of which were crowned with evergreen oaks

of a laurel and olive foliage, intermingled with small palm trees. This beautiful vegetation formed a singular contrast with the aridity of the plain, which was laid waste by volcanic fire.

Till the middle of the eighteenth century, fields cultivated with sugar-cane and indigo occupied the extent of ground between two brooks, called Cuitamba, and San Pedro. They were bounded by basaltic mountains, of which the structure seemed to indicate that all this country at a very remote period had been already several times convulsed by volcanoes. These fields, watered by artificial means, belonged to the plantation of San Pedro de Jorullo, one of the greatest and richest of the country. In the month of June, 1759, a subterraneous sound was heard. Hollow noises of a most alarming nature were accompanied by frequent earthquakes, which succeeded one another for from fifty to sixty days, to the great consternation of the inhabitants of the plantation. From the beginning of September everything seemed to announce the complete re-establishment of tranquillity, when in the night between the 28th and 29th, the horrible subterraneous noise recommenced. The affrighted Indians fled to the mountains of Aguasarco. A tract of ground, from three to four square miles in extent, rose up in the shape of a bladder. The bounds of this convulsion were still distinguishable in the fractured strata. The Malpays near its edges was only thirty-nine feet above the old level of the plain; but the convexity of the ground thus thrown up increased progressively towards the centre to an elevation of about five hundred and twenty feet.

Those who witnessed this great catastrophe from the

top of Aguasarco, asserted that flames were seen to issue forth for an extent of more than half a square league, that fragments of burning rocks were thrown up to prodigious heights, and that through a thick cloud of ashes, illumined by the volcanic fire, the softened surface of the earth was seen to swell like an agitated sea. The rivers of Cuitamba and San Pedro precipitated themselves into the burning chasms. The decomposition of the water contributed to invigorate the flames, which were distinguishable at Pascuaro, though it was situated on extensive table-land, four thousand six hundred feet elevated above the plains of Jorullo. Eruptions of mud, and especially of strata of clay enveloping balls of decomposed basalts in concentrical layers, appeared to indicate that subterraneous water had no small share in producing this extraordinary revolution. Thousands of small cones, from six to nine feet in height, called by the Indians ovens, issued forth from the Malpays. Each small cone was a funnel, from which a thick vapour ascended to the height of forty or fifty feet. In many of them a subterraneous noise was heard, which appeared to announce the proximity of a fluid in ebullition.

In the midst of the ovens six large masses elevated from thirteen hundred to seventeen hundred feet each above the old level of the plains, sprung up from a chasm. The most elevated of these enormous masses was the great Volcano of Jorullo. It was continually burning, and had thrown up from the north side an immense quantity of scorified and basaltic lavas containing fragments of primitive rocks. These great eruptions of the central volcano continued till the month of February, 1760. In the following years they became gradually less

frequent. The Indians, frightened at the horrible noises of the new volcano, abandoned at first all the villages situated within seven or eight leagues of the plain of Jorullo. They became by degrees, however, accustomed to this terrific spectacle; and having returned to their cottages, they advanced towards the mountains of Auguasarco and Santa Ines, to admire the streams of fire discharged from an infinity of great and small volcanic apertures. The roofs of the houses of Queretaro were then covered with ashes at a distance of more than forty-eight leagues in a straight line from the scene of the explosion. Although the subterraneous fire appeared to Humboldt far from violent, and the Malpays and the great volcano began to be covered with vegetables, he found the ambient air heated to such a degree by the actions of the small ovens, that the thermometer, at a great distance from the surface, and in the shade, rose as high as 109°. This fact appeared to prove, that there was no exaggeration in the accounts of several old Indians, who affirmed, that for many years after the first eruption, the plains of Jorullo, even at a great distance from the scene of the explosion, were uninhabitable, from the excessive heat which prevailed in them.

Humboldt was shown, near the Cerro de Santa Ines, the rivers of Cuitamba and San Pedro. These streams disappeared in the night of the 29th September, 1759; but, at a distance of six thousand five hundred feet farther west, in the tract which was the theatre of the convulsion, he saw two rivers bursting through the argillaceous vault of the ovens, of the appearance of mineral waters, in which the thermometer rose to 126°. The Indians continued to give them the names of San Pedro and

Cuitamba, because in several parts of the Malpays great masses of water were still heard to run from east to west.

In the opinion of the Indians, these extraordinary transformations, the surface of the earth raised up and burst by the volcanic fire, and the mountains of scoria and ashes heaped together, were the work of the monks, the greatest, no doubt, which they have ever produced in the two hemispheres! In the cottage which Humboldt occupied in the plains of Jorullo, his Indian host related to him, that, in 1759, Capuchin missionaries came to preach at the plantation of San Pedro, and not having met with a favourable reception (perhaps not having got so good a dinner as they expected), they poured out the most horrible and unheard of imprecations against the then beautiful and fertile plain, and prophesied that in the first place the plantation would be swallowed up by flames rising out of the earth, and that afterwards the ambient air would cool to such a degree, that the neighbouring mountains would for ever remain covered with snow and ice. The former of these maledictions having already produced such fatal effects, the Indians contemplated in the increasing coolness of the volcano, the sinister presage of a perpetual winter.

After visiting the volcano of Jorullo, and descending, on the 19th of September, two hundred and fifty feet into the burning crater of the central cone, Humboldt returned to the capital. The arrangement of his botanical and geological collections, and the regulation and calculation of his barometric and trigonometric measurements, detained him and Bonpland there until the beginning of January, 1804. It would have been difficult to have found anywhere, least of all in the *dolce far niente* of

Mexico, two busier men than the travellers were at this time. They were up to their eyes in work, Humboldt surrounded with rocks, ores, minerals, observations, maps and road-books, and Bonpland with thousands of strange plants, many of them unknown to botanists. But busy as they were, the travellers found time to mingle in the gay society of the capital, and to make short excursions in the neighbourhood.

Having made several journeys to the northern, western, and southern parts of the country, Humboldt now determined to see some of the eastern portions, lying along the gulf of Mexico. So in company with Bonpland he started off in January for Xalapa and Vera Cruz. On their way the travellers stopped at the volcanoes of Iztaccihuatl and Popocatepetl, and the pyramid of Cholula. This famous pyramid, the largest in all Mexico, stood in the vicinity of the old city of Cholula, in the intendancy of Puebla. "The inhabitants of this city," so writes Cortez, in his third letter to the Emperor Charles V., "are better clothed than any we have hitherto seen. People in easy circumstances wear cloaks above their dress. These cloaks differ from those of Africa, for they have pockets, though the cut, cloth, and fringes are the same. The environs of the city are very fertile and well cultivated. Almost all the fields may be watered, and the city is much more beautiful than all those in Spain, for it is well fortified, and built on very level ground. I can assure your highness, that from the top of a mosque, I reckoned more than four hundred towers all of mosques. The number of the inhabitants is so great, that there is not an inch of ground uncultivated; and yet in several places the Indians experience

the effects of famine, and there are many beggars, who ask alms from the rich in the streets, houses, and market-place, as is done by the mendicants in Spain, and other civilized countries."

When the pyramid of Cholula was in its prime, its summit was covered with an altar dedicated to Quetzalcoatl, the God of the Air. He was a white and bearded man, like the Bochica, of whom we have spoken in our description of the falls of Tequendema. He was high priest of Tula, legislator and chief of a religious sect, which inflicted on themselves the most cruel penances. He introduced the custom of piercing the lips and ears, and lacerating the rest of the body with the prickles of the agave leaves, or the thorns of the cactus; and of putting reeds into the wounds, in order that the blood might be seen to trickle more copiously.

The reign of Quetzalcoatl, strange to say, was the golden age of the people of Anahuac. Men and animals lived in peace: the earth brought forth without culture the fruitfullest of harvests, and the air was filled with innumerable birds, of whom it was difficult to say, which was most admired—the beauty of their plumage, or the sweetness of their song. Such a blessed epoch could not, and did not last long. The great spirit Tezcatlipoca, offered Quetzalcoatl a rare beverage which rendered him immortal, and inspired him with a taste for travelling. He started off at once for the distant country of Tlap allan. The inhabitants of Cholula, through whose territory he passed, offering him the reins of government, he remained among them twenty years. He taught them to cast metals; ordered fasts of eight days; regulated the intercalations of their year; preached peace to them, and

would permit no other offerings to the Divinity than the first fruits of the harvest. From Cholula he proceeded to the mouth of the river Goasacoalco, where he disappeared, declaring however, that he would return soon, to govern the Cholulans again, and renew their happiness.

The unhappy Montezuma thought he recognised the posterity of this saint in the soldiers of Cortez! "We know by our books," said he in his first interview with the Spanish General, "that myself and those who inhabit this country are not natives, but strangers who came from a great distance. We know also that the chief who led our ancestors hither, returned for a certain time to his primitive country, and thence came back to seek those who were established here. He found them married to the women of this land, and living in cities which they had built. Our ancestors hearkened not to their ancient father, and he returned alone. We have always believed that his descendants would one day come to take possession of this country. Since you arrive from that region where the sun rises, and, as you assure me, you have long known us, I cannot doubt, but that the king who sends you, is our natural master." So far Cortez in his first letter. How far he and his soldiers resembled Quetzalcoatl, the Mexican Prince of Peace, the readers of Mexican history must judge for themselves.

Cholula in its glory was one of

> "The Delphian vales, the Palestines,
> The Meccas of the mind."

It was the holy city of the ancient Mexicans, who resorted thither from the most distant parts of the empire.

Its streets were picturesque with the long train of their processions, its winds were jubilant with their barbaric music. With noise and pomp they marched to the great pyramid, whose summit was crowned with perpetual flame, that rose from the temple of Quetzalcoatl. Climbing the steps that led from terrace to terrace they reached the shrine, and worshipped the image of the god. It was a monstrous idol of stone, holding in one hand a shield covered with hieroglyphics, and in the other a jeweled sceptre. Upon its head was a mitre with plumes; its neck was encircled with a collar of gold, while from its ears hung pendants of turquoise. "Glory to Quetzalcoatl! the mighty God of the Air!"

But to return from the Past to the Present, from Tradition to Fact. The perpendicular height of the pyramid when Humboldt and Bonpland saw it, was one hundred and seventy-seven feet; the horizontal breadth of its base was one thousand four hundred feet. It had four sides, facing the cardinal points, and as many terraces; altogether it covered a space of forty-five thousand square feet. They had a magnificent view from its summit, seeing at one glance four mountains, Popocatepetl, Iztaccihuatl, the peak of Orizaba, and the Sierra de Tlascala, famous for its tempests. Three of these mountains were higher than Mont Blanc, two were burning volcanoes.

The Pyramid of Cholula was built of unbaked bricks, alternating with layers of clay. Humboldt was assured by the Indians that the inside was hollow. During the abode of Cortez at Mexico, their ancestors, they said, concealed in the body of the pyramid a considerable number of warriors, for the purpose of falling suddenly on the Spaniards. The material of which the pyramid

was built, and the silence of historians on so singular a circumstance led Humboldt to doubt the truth of the tradition. It was certain, however, that in this pyramid there were several cavities, which had been used as sepulchres for the natives. A short time previous the old road which ran from Puebla to Mexico was changed, and in tracing the new one the first terrace was cut through, so that an eighth part remained isolated, like a heap of bricks. In making this opening a square house was discovered in the interior of the pyramid. This house contained two skeletons, several idols in basalt, and a great number of vases curiously varnished and painted. There was no outlet! To whom did these vases and idols belong? Of whom were those skeletons the remains? Humboldt conjectured that the pyramid was built by prisoners, taken by the Cholulans in their wars with the neighbouring nations, and that these were the skeletons of some unfortunate slaves who had been shut up in the interior of the pyramid to perish. It seems to us, however, that they were the remains of some important state personages, condemned for some reason which must ever remain unknown, to die in this horrible manner. Might not the King of the Toltecs, like another civilized barbarian of later times, have had his Man in the Iron Mask? A wife false to him? A daughter loving below herself?

Upon the platform of the pyramid the Spaniards had built a little chapel, dedicated to the Virgin de los Remedios. Here an ecclesiastic of Indian blood celebrated mass every day. Crowds came from far and near to witness the festival, and among them were many of the descendants of the ancient people, to whom the land had once belonged. What thoughts must have crowded

upon them as they stood there, silent and degraded, the last of their race! "Glory to Quetzalcoatl!" no longer rent the air; it was drowsy with "the blessed mutter of the mass," and

"Good, strong, thick, stupifying incense-smoke."

Quetzalcoatl had passed away, but his altar still remained. A mysterious dread, a religious awe pervaded their souls as they gazed upon that immense pile, covered with shrubbery and perpetual verdure.

The pyramid of Cholula having led the travellers a little beyond Iztaccihuatl and Popocatepetl, they turned back and visited these volcanoes. Before proceeding to Xalapa, Humboldt determined their geographical position by his observations, and measured their height. Iztaccihuatl he found to be fifteen thousand seven hundred feet above the sea, and Popocatepetl seventeen thousand seven hundred, which was two thousand feet higher than the most elevated summit of the old world. He ascended to the summit of the latter mountain. It was an ever-burning volcano, but for several centuries it had thrown up nothing from its crater but smoke and ashes.

Speaking of a report that prevailed in Mexico, that Diego Ordaz penetrated into the crater of Popocatepetl, for the purpose of procuring sulphur for the Spaniards to make powder with, Humboldt gossips thus about the circumstance, and the mountain itself.

"When the united army of the Spaniards and Tlascaltecs, in the month of October, 1519, marched from Cholula to Tenochtitlan, across the Cordillera of Ahualco, which unites the Sierra Nevada to the volcanic summit

of Popocatepetl; the army suffered both from the cold, and the extreme impetuosity of the winds, which constantly prevail on the table-land. Writing of this march to the Emperor, Cortez expresses himself in the following manner: 'Seeing smoke issue from a very elevated mountain, and wishing to make to your royal excellency a minute report of whatever this country contains of wonderful, I chose from among my companions in arms, ten of the most courageous, and I ordered them to ascend to the summit, and to discover the secret of the smoke, and to tell me whence and where it issued.'

"Bernal Diaz affirms that Diego Ordaz was of that expedition, and that this captain attained the very brink of the crater. He may have happened to boast of it afterwards, for it is related by other historians, that the Emperor gave him permission to place a volcano on his arms. Lopez de Gomara, who composed his history from the accounts of the Conquistadores and religious missionaries, does not name Ordaz as the chief of the expedition; but he vaguely asserts that two Spaniards measured with the eye the size of the crater. Cortez, however, expressly says: 'That his people ascended very high; that they saw much smoke issue out, but that none of them could reach the volcano, on account of the enormous quantity of snow with which it was covered, the rigour of the cold, and the clouds of ashes that enveloped the travellers.' A terrible noise which they heard on approaching the summit determined them to turn immediately back. We see from the account of Cortez, that the expedition of Ordaz had no view of extracting sulphur from the volcano, and that neither he nor his companions saw the crater in 1519. 'They brought

back,' says Cortez, 'only snow and pieces of ice, the appearance of which astonished us very much, because this country is under the 20° of latitude, in the parallel of the island Espanola, and consequently, according to the opinion of the pilots, ought to be very warm.'

"Three years later, however, after two unsuccessful attempts, the Spaniards succeeded in seeing the crater of Popocatepetl. It seemed to them three-fourths of a league in circumference, and they found on the brink of the precipice a small quantity of sulphur, which had been deposited there by the vapours. Cortez relates: 'that he is in no want of sulphur for the manufacture of powder, because a Spaniard drew some from a mountain which perpetually smokes, by descending, tied to a rope, to the depth of from seventy or eighty fathoms.'

"A document preserved in the family of the Montaños, and which Cardinal Lorenzana affirms he once had in his hands, proves that the Spaniard of whom Cortez speaks, was Francisco Montaño. Did that intrepid man really enter into the crater of Popocatepetl; or did he extract the sulphur, as several persons in Mexico suppose, from a lateral crevice of the volcano? M. Alzate, with very little foundation affirms, that Diego Ordaz extracted sulphur from the crater of the old volcano of Tuctli, to the east of the lake of Chalco, near the Indian village of Tuliahualco. The makers of contraband powder no doubt procure sulphur there; but Cortez expressly designates Popocatepetl by the phrase, 'the mountain which constantly smokes.' Be this as it may, it is certain that after the rebuilding of the city of Tenochtitlan, the soldiers of the army of Cortez ascended the summit of Popocatepetl, where nobody has since been."

From the volcanoes of Iztaccihuatl and Popocatepetl, the travellers proceeded to Xalapa, travelling for the most part over lofty mountains, and through dense forests of oaks and fir-trees. They lodged while at Xalapa in the convent of Saint Francis, the view from which was magnificent. On one hand they could see the plains and the ocean; on the other the declivities of the Cordilleras of Anahuac, and the colossal summits of Orizaba and the Coffer of Perote. The Coffer of Perote was a rock of singular shape on the eastern side of the summit of the porphyritic mountain of that name. It resembled a square tower, and served as a signal to the sailors who put in at Vera Cruz. The harbour of Vera Cruz, and the castle of San Juan de Ulua, were visible from this great watch-tower. Nothing at the summit announced a crater, yet the mountain was enveloped in a thick bed of pumice-stone. Its height was thirteen thousand five hundred feet. The peak of Orizaba, which Humboldt ascended, and which he always regarded as the most magnificent mountain in the world, was two or three hundred feet higher than the crater of Popocatepetl.

The intendancy of Vera Cruz like that of Puebla was celebrated for its ruins. The most remarkable of these was the pyramid of Papantla. It was situated in the midst of a thick forest, at the distance of two leagues from a great Indian village. It was unknown to the Spaniards, for centuries; for as it was an object of veneration among the Indians, they concealed its existence from the conquerors of their country; and it was only discovered accidentally by some hunters, about thirty years before the time of Humboldt's visit. It was not constructed of bricks, or clay mixed with stones, and

faced with a wall, like the pyramids of Cholula and Teotihuacan; the only materials employed were immense stones of a porphyritical shape. Mortar was distinguishable in the seams. The edifice, however, was not so remarkable for its size as for its symmetry, the polish of the stones, and the great regularity of their cut. The base of the pyramid was an exact square, each side being eighty-two feet in length. The perpendicular height appeared not to be more than from fifty to sixty feet. This monument, like all the Mexican temples, was composed of several terraces. Six were still distinguishable, and a seventh appeared to be concealed by the vegetation with which the sides of the pyramid were covered. A great stair of fifty-seven steps conducted to the truncated top of the pyramid, where the human victims were sacrificed. On each side of the great stair was a small stair. The facing of the terraces was adorned with hieroglyphics, in which serpents and crocodiles carved in relief were discernible. Each terrace contained a great number of square niches symmetrically distributed. In the first story were twenty-four on each side, in the second twenty, and in the third sixteen. The number of these niches in the body of the pyramid was three hundred and sixty-six, and there were twelve in the stair towards the east. The Abbé Marquez supposed that this number of three hundred and seventy-eight niches had some allusion to a calendar of the Mexicans; and he even believed that in each of them one of the twenty figures was repeated, which, in the hieroglyphical language of the Toltecs, served as a symbol for marking the days of the common year, and the intercalated days at the end of the cycles.

The route from Xalapa to Perote was thrice travelled over by Humboldt and Bonpland, and each time subjected to barometric measurements, for the purposes of a post road, which was afterwards constructed in that locality, according to Humboldt's plans.

The remainder of their stay in the New World was destitute of incident, and may be summed up briefly.

From Xalapa they proceeded to Vera Cruz, where the yellow fever was raging. They stopped here a few days when a Spanish frigate sailing for Havana, they took passage in her, quitting the shores of Mexico on the 7th of March. They remained at Havana two months attending to the packing and shipping of their various collections, and then set sail for Philadelphia, which they reached after a stormy passage of thirty-two days. While in Philadelphia, at a public library, Humboldt received intelligence which delighted him. It was in a scientific publication, and to this effect: "Arrival of M. de Humboldt's manuscripts at his brother's house in Paris, by way of Spain." He could hardly help shouting for joy.

From Philadelphia they proceeded to Washington, where Humboldt was introduced to Jefferson.

They left the New World on the 9th of June, 1804.

BOOK III.

1804—1829.

CHAPTER I.

BOOKS.

One pleasant August day, fifty-five years ago, in a quiet chamber in Paris, sat a pale and thoughtful woman. The chamber was decidedly French, the furniture dating back, it may be, to the days of *Louis Quatorze;* yet there was something in its atmosphere not quite in keeping. Perhaps it was the books and pictures, both of which were German, or it might have been the lady herself, who was also German. She was not beautiful; her figure was a little crooked, but the *contour* of her head was fine, and her eyes were remarkably brilliant. Indeed, her eyes were too brilliant, large and lustrous, as is often the case with those who are, or have been, ill. That this lady was ill, could be seen at a glance. Being a wife and mother she had known all the pains and pleasures of woman. She knew what it was to give birth to children, and to have her children die. A few months before she had given birth to a daughter, her fifth child, who soon died. It was this that made her pale and thoughtful. On the couch beside her lay a book, which she had just been reading, a German book, the work of Goethe, or Schiller. Beside her was a bundle of letters, one with a foreign post mark. It was directed to her husband,

William Von Humboldt. The lady was Frau Caroline, and the letter was from Alexander. It was dated in March, at Havana, and announced his speedy return from the New World. Two or three months had passed since it was received in Rome, and yet there were no tidings of him. None, at least, that they wished to believe. There was at one time an ugly report that he had died of the yellow fever, but it lacked confirmation, they thought. So Frau Caroline, who had been spending a few weeks at Weimar, with her friend Schiller, had come up to Paris to see if she could not learn something definite concerning the long-absent Alexander.

While she was sitting there with his letter before her, that pleasant August day, there came a tap at the door, and a note was handed her by a messenger. It was from the Secretary of the National Institute, announcing the arrival of the traveller in the Garonne. He was then at Bordeaux, and would shortly be in Paris. Her heart was lightened of one load; her pale cheek kindled, and snatching a pen, she wrote the good news to her husband.

In a few days Alexander himself appeared.

From time to time during his five years' absence, rumours of his travels were noised abroad, and he was much talked about, not only by scientific men, who naturally felt a deep interest in him and his pursuits, but by the world at large. Great changes had been wrought since he left; battles had been fought, before which the famous fields of antiquity must "pale their ineffectual fires:" empires had risen and fallen, or were tottering to their fall, yet he was not forgotten. The crash of empires, the thunder of battles had not drowned the "still small

voice" of Science, and the name of its most distinguished votary, Alexander Von Humboldt. He returned to find himself famous.

He was warmly welcomed by the *savans* of Paris. The collections which he had brought from the New World were richer than any that had ever before been brought into Europe from foreign countries. Other travellers, selecting some *specialité*, with which they particularly sympathized, had enriched different departments of science, but Humboldt and Bonpland, universal in their tastes and pursuits, enriched all. Botany, geology, mineralogy, geography, climate—they left nothing untouched. Their collections and journals contained the natural history of a continent. They had achieved a great triumph by their travels, but its fruit was yet to come. As they had travelled for the interests of science rather than their own private gratification, for the world rather than themselves, it was necessary that the world should know the results of their travels. For themselves it was not necessary, for they could recall them day by day, and step by step, without even turning to their journals. The rocks and ores in their cases, the plants in their herbals, were dumb historians of their progress. Even their mirrors were tell-tales, whispering, as they reflected their sun-bronzed faces, the gorgeous secret of the tropics. Of this, however, the world could know nothing. They might, as they afterwards did, deposit their collections in Museums of Natural History. This would be something towards making known the results of their five years' sojourn in the New World, but it would not be much after all. By this means they might reach the scientific and the curious, but not the world.

There was but one way to reach the world, and that was by writing.

Such, we may conceive, were the thoughts of the travellers as they surveyed their collections and journals. In the meantime there were some arrears to be settled before they could fully resume their old life of civilization and refinement. There were half-sundered ties to be renewed; letters to be written; friends to be seen; homes to be visited; and for one at least, a debt of love to be paid. Before Alexander could begin the great work he must see his brother William, who was then at Albano. He learned from Frau Caroline, to whom his return had been a cordial of health, all that had taken place since his departure. When he started for the New World he left William in Paris, but the letters which he wrote him during his journey in Spain, led the latter to undertake a journey thither. He left Paris in July or August, 1799, accompanied by Frau Caroline and his family, and proceeded to Garonne and the Pyrenees, crossing over into Spain at St. Jean de Luz. In the autumn he reached Biscay. He was delighted with the Basque nation, whose strange language opened a new field for his philological studies. From Vittoria he travelled to Madrid: thence to Cadiz, Seville, Valencia, and Barcelona. The journey ended in the plains and mountains of Catalonia.

In 1802 he was made a chamberlain by the King of Prussia, and appointed privy counsellor of legation, and resident-ambassador at the court of Rome, an office which he still filled. In literature he had not done much, beyond planning great works, many of which were never executed. He was then, or as Frau Caroline

doubtless said to Alexander, in August, 1804, "He is now translating Agamemnon."

The fact of William's being hard at work on his beloved Æschylus, and that Frau Caroline intended to remain in Paris until the commencement of the following year, determined Alexander to remain there until he had regulated his collections and arranged his journals for publication. He renewed his intimacy with his former scientific associates, especially with his friend, Gay-Lussac, who had just distinguished himself as an æronaut, by making two ascensions from the Conservatory of Arts, one with M. Biot, on the 24th of August, and one alone, on the 15th of September. The object of these ascensions was to examine whether the magnetic power experienced any appreciable diminution as we leave the surface of the earth. Saussure, who made experiments on the Col du Geant, at eleven thousand feet above the level of the sea, thought he could perceive a very sensible decrease of magnetic virtue: some æronauts even asserted that it vanished at a certain height. Loaded with a cargo of galvanic apparatus, barometers, thermometers, hygrometers, and electrometers, besides a small menagery of frogs, insects, and birds, Biot and Gay-Lussac rose from the Conservatory amid the plaudits of all Paris. The lower side of the clouds through which they passed had a bluish tint, similar to that which they exhibit on the surface of the earth, but as they rose above them, they saw that they were full of small eminences and undulations, like a vast field of snow ploughed and drifted by the wind. They commenced their experiments at the height of six thousand five hundred feet, and continued them to the height of fifteen thousand seven hundred feet, and the result of

their observations was that the magnetic property experienced no appreciable diminution.

This first trip not being considered satisfactory in some respects, Gay-Lussac made the second alone, and ascended to the height of four miles and a quarter. He still saw clouds above him, at a great height, but none below. The atmosphere had a dull misty appearance. He suffered intensely from the cold during his experiments. His hands were benumbed; he breathed with difficulty; his pulse was much quickened, and his throat was so parched that he could scarcely swallow a morsel of bread. The result of his experiments was the same as before—namely, that the magnetic quality does not diminish as we proceed from the surface of the earth.

Humboldt, to whom great heights were by this time no novelty, was deeply interested in these researches of Gay-Lussac, and afterwards joined him in them. His only literary labour at this time was an essay on the Geology of America, published in the "Journal of Natural History."

In the spring of 1805 he accompanied Frau Caroline, who in the meantime had had another child, a little Gustavus, to Albano. The reader will be good enough to imagine the meeting of the brothers, who were both men of strong feelings, though they did not always show them, and loved and respected each other as two such brothers should. Be sure they had much to talk of, before they settled into the quite routine of life, William of his studies, and Alexander of his travels. He had remembered his brother's tastes in the distant regions of the New World, and had collected for him, in missions and cloisters, and wherever he could, a great number of

grammars of American dialects. These treasures he gave to William, with the stipulation that he would occasionally lend them to Professor Vater and Frederick Schlegel, both noted philologists.

The Humboldts were as much sought after at Albano, as they had previously been at Paris, not only by their own countrymen, of whom they knew a goodly number, but by all the learned and great, residing in Rome and the vicinity. They still gave dinner parties, esthetic teas, etc., to which the elect were invited. Among those who visited them at this time were the sculptors, Thorwaldsen and Rauch, and Sismondi, A. W. Schlegel, and Madame de Stael. The latter lived so near the Humboldts that they might be said to form one household.

Notwithstanding the gay life that he led at Albano, Humboldt was far from idle; for he contrived to find or make time to visit the great libraries of Rome, especially that of the Vatican, and the famous Museum of Cardinal Borgia, of Velletri. This Museum was rich in hieroglyphical writings, especially those of Mexico, and he renewed in it his acquaintance with his old friends, the Aztecs, and copied some quaint specimens of their singular picture-language. And, better still, he was joined, about this time, by Gay-Lussac, and Leopold Von Buch. Learning that Vesuvius was active, they had come to Italy, the one from Paris, and the other from Germany, to be present at the expected eruption. They witnessed it with Humboldt on the 12th of August. As neither have left a record of the impression it made upon them, we conclude that it was not remarkable, or, what is quite as likely, that they were preoccupied with other pursuits. Gay-Lussac was still engaged with his magnetic experi-

ments, in which he was assisted by Humboldt and Von Buch, the latter examining the magnetic qualities of the serpentine rocks of Vesuvius. In the autumn Humboldt departed for Berlin, where he remained nearly two years. Though he wrote largely during this year, he seems to have published little, except an "Essay on Botanical Geography," and a paper on magnetism.

From this time for twenty years and more, his life was as destitute of incident as can well be imagined; except in a bibliographical point of view it is nearly a blank to his biographers. Yet this blank covers the most prolific period of his genius, for in it he wrote all his great works, except "Kosmos." From 1805 to 1829—from his thirty-sixth to his sixtieth year, not much is known of Humboldt. We know where he lived during that time; this year he was in Berlin, we can say, and that year in Paris; but this is little. To be sure locality is something, for it helps statistical readers to facts, which are never to be despised; but an authentic leaf from the book of his life, a momentary gleam of thought or feeling would be worth centuries of mere locality.

And here we are reminded of a thought which has often come home to us with striking force, when reading the biographies of great men. It is this: No man's life was ever written! If a biographer is skilful, like Boswell for instance, he gives us a life-like picture of his hero: the colour of his eyes and hair, his voice, his manner of speaking, his gestures: his little peculiarities of dress, the snuff on his shirt frills, or, possibly, the stains of his last night's wine; or, as in the case of Poor Goldy, the awkward patch on the breast of his coat. Still, we are not satisfied. Delighted we may be, but satisfied we

are not. We feel all the while that this is not the man, it is but his outline, his frame, his shell. What we want to get at is the man himself, and unfortunately that is just what we never do get at. It is but little to know that his head is covered with golden curls, or thatched with the snows of age, when we know nothing of the brain within it—nothing of the thoughts that struggle there like mad demons, or sleep serenely like angels. Give us an insight into the man: open his secret doors and let us see his heart, whether it be noble or base. Does his blood run rich with love, or boil and seethe with hate? Or does it lie like a stagnant pool in a dead marsh, loathsome, horrible? We can never know.

Granting, however, that the inner life of a man is hidden from us, there is still his outer life to be narrated, and it is with this that most biographers occupy themselves. It is not, or should not be, difficult to write the life of a soldier, for the biographer's work is ready done to his hands. What can be want better than

> "The spirit-stirring drum, the ear-piercing fife,
> The royal banner, and all quality,
> Pride, pomp, and circumstance of glorious war?"

The biographies of actors, and other adventurers, are excellent reading. But authors, whose days and years are proverbially barren of incident, and whose profession keeps them from mingling actively with the world—how shall their lives be made interesting? The most that can be done for an author, in a picturesque point of view, is to describe him with pens, ink, and paper before him. From these, by the subtle alchemy of his genius, books are made—poems, novels, histories, but how is a mystery,

often to the author himself. A man at a table writing, or, as Miss, who doats on his books, fancies, a pale and spiritual genius in his study at night, his brain labouring with thought, which his fingers are not swift enough to jot down—let the picture be as romantic as possible, the world will never think it equal to a battle-field, although it reiterates complacently,

"The pen is mightier than the sword."

As with the author, so with the man of science, or rather worse with him, for his life, while it is similar to the author's, is generally less interesting, which makes the writing of his biography more difficult. Fortunately, however, Humboldt was more than a mere man of science, and his life in the main was a stirring one. There were intervals of comparative quiet in it, chasms of scientific and literary labours, yawning, as it were, between epochs of travel and adventure; but these once bridged over, all is well. We shall bridge over, in this chapter, Humboldt's scientific life in Paris.

We left him at Berlin in the autumn of 1805. There was no reason for his quitting Albano where he was so happily situated, except that he needed more solitude than he could find there. He was, doubtless, too happily situated to work as he wished. He remained at Berlin two years, writing, and pursuing his scientific researches. He continued his magnetic observations, and the result of his experiments was, that mountain chains and even active volcanoes exercise no perceptible force on the magnetic power, but that it deviates gradually with its distance from the equator.

He wrote largely at this time, working up different

portions of his travels, in the form of essays and treatises, which he read before the Academy of Berlin. Two of these papers, one on Steppes and Deserts, and another on the Cataracts of the Orinoco were included in his "Aspects of Nature." Upon this book, which was the first, not purely scientific, that he wrote after his return to Europe, he was now busily engaged. Not having made up his mind as to the exact form in which he would cast his journey, he selected some of its most striking incidents and phenomena, and interwove them in a series of papers, which he called "Aspects of Nature."

The "Aspects of Nature" is one of the few books that he wrote in his native language, and for that reason perhaps it was always a favorite with him. When he wrote for the scholars of Europe he wrote in French or Latin, but when he wished to reach the hearts of his countrymen he wrote in German. It was not published until 1808, when he had left Berlin for Paris. It was dedicated to his brother William, who acknowledged the compliment in one of his finest poems. Humboldt's literary life in Berlin may be summed up in the writing of the "Aspects of Nature," and in the writing and publishing of four smaller works, "Ideas on a Geography of Plants," "A Picture of the Natural Productions of the Tropics," a "Tableau of the Equinoctial Regions," and a treatise on "Electric Fish."

In the autumn of 1807 Humboldt removed to Paris, in order to be near his beloved collections, and to commence his long-delayed work. He had come to the conclusion that it could not be done properly, or at any rate as he wished to have it done, by one man in the course of a life-time, so he divided the material among the *savans* of

Paris, giving to each the portion for which his tastes and studies had fitted him. No city in the world was ever so rich in men of science, as Paris was then, and all these men were Humboldt's personal friends. He was acquainted with most of them before he started on his travels: when he returned, opulent in knowledge and experience, his acquaintance was sought by the rest. Among his friends at this time, and for years afterwards, in fact till the close of their lives, for Humboldt never lost a friend, except by death, we may mention Biot, Gay-Lussac, Latreille, Cuvier, Laplace, Arago, and Berthollet. Arago and Gay-Lussac were the youngest of the band, the former being in his twenty-second year, the latter in his twenty-ninth. The oldest were Laplace and Berthollet, both of whom were within a few months of fifty-nine. Cuvier was born in the same year with Humboldt, and like him was thirty-eight.

Claude Louis Berthollet was born at Talloire, in Savoy, on the 9th of December, 1748. Receiving his early education at Chambery, he entered the university of Turin, where he obtained a diploma as doctor of medicine. Armed with this formidable weapon he came to Paris, and was fortunate enough to be appointed physician to the Duke of Orleans. While holding this situation he devoted himself to the study of chemistry, and published his "Essays," which made him favourably known in the world of letters. The influence of the Duke procured for him, some years later, the office of government commissary, and superintendent of dyeing processes. This led him to write a work on the theory and practice of dyeing. He was soon after engaged in another kind of dying, or rather trying to help the

French people towards the material for it. When the Revolution had involved the country in war, saltpetre, which at first was plentiful enough, finally became scarce, owing to the difficulties of importation. To make up the deficiency Berthollet travelled over France, and showed its sanguinary *citoyens* how to extract and purify the salt. Under his teaching any man who desired it, might have had a private powder-manufactory of his own.

In addition to his little lessons in the art of extemporizing gunpowder, Berthollet was engaged, like many other men of science at the time, in teaching the French the art of smelting iron, and converting it into steel. The swords of the *citoyens* were probably a little dinted with hacking each other, so they wanted new ones.

In 1792 we find Berthollet one of the Commissioners of the Mint, and two years later a member of the Commission of Agriculture and Arts, and Professor of Chemistry in the Polytechnic and Normal Schools. In 1796 the Directory, who began to think of returning to civilization, sent him to Italy to select works of art and science for the capital. Meeting General Bonaparte there, he joined the expedition to Egypt, and helped to form the Institute of Cairo. On his return to France Napoleon, then first consul, made him a senator, and grand officer of the Legion of Honour, and shortly afterwards created him a count.

George Leopold Christian Frederic Dagobert Cuvier, the most celebrated anatomist of modern times, was born at Montbeliard, on the 23d of August, 1769, twenty-two days before Humboldt. From his earliest childhood he gave indications of great talent. He learned to draw from the works of Buffon, a copy of which, illustrated

with plates, fell into his hands in his twelfth year. Latin and Greek were among his first studies; he learned them as by intuition, and German with equal facility. He also made himself master of most of the modern languages. He had a passion for all kinds of reading, especially for history, the driest details of which he mastered, and remembered without an effort.

Proficient at the age of fourteen in all the branches of study taught in the school of Montbeliard, he was sent to the Caroline Academy, at Stuttgard, where he remained four years. His favourite study was the science of government, which was one of the five different faculties in which lessons were given at this academy. His great mental endowments were at once recognised by the professors, and by none more warmly than M. Abel, the professor of Natural History, who rekindled in the mind of the young student his early taste for that science.

When the Revolution broke out, Cuvier was residing in Normandy. Here he met the naturalist, Jessier, who discovered his scientific attainments, and put him in communication with the *savans* of Paris. He repaired thither in 1795, when the fury of the Revolution had subsided, and by the interest of Jessier and Mellin was appointed a member of the Commission of Arts, and soon after a professor of the School of the Pantheon. For the use of this school he composed a treatise on the natural history of animals, which served as the basis of all subsequent works on zoological classification. From the School of the Pantheon he passed to the Museum of Natural History, where he filled the chair of Comparative Anatomy. When Bonaparte returned from Egypt, in 1800, he was secretary to the National Institute. The

revolution of the 18th Brumaire, made the victorious general first consul, and led him to assume the title of President of the Institute. This made him acquainted with Cuvier, who vacated the post of secretary for the chair of Natural History. Wishing, in 1802, to remodel the system of public instruction, Napoleon named him one of the six inspectors, who were directed to establish lyceums in the principal towns in France. His commission directed him to Bordeaux and Marseilles. He established lyceums in these cities, and returned to Paris, shortly before Humboldt made it his permanent abode.

Pierre Simon Laplace, the world-renowned mathematician, was born in Normandy on the 23d of March, 1749. Of his youth nothing is related, except that he was remarkable for his talents. He achieved his first success in theology, which he soon abandoned for the study of geometry. To perfect himself in the science, he came to Paris, with letters of recommendation to D'Alembert. He presented himself at the house of this philosopher, but could not succeed in reaching him. Finding his recommendations useless he sat down and wrote D'Alembert a letter on the general principles of mechanics. Astonished at its profundity, D'Alembert in his turn waited upon Laplace. "Sir," said he to the young geometrician, "you see that I pay little attention to recommendations. You have no need of them. You have made yourself better known; that is sufficient for me. You may command my support." In a few days he had Laplace appointed Professor of Mathematics to the Military School of Paris.

The wind of good luck, blowing from the 18th of Brumaire, made Laplace Minister of the Interior. His talent for statesmanship not being equal to his talent for

mathematics and geometry, he resigned the portfolio of his office to Lucien Bonaparte. He was then created a senator, then vice-chancellor, and at length chamberlain of the conservative senate.

Of his various scientific writings, especially of his immortal work, the *Traite de Mécanique Céleste*, we shall not speak here; neither shall we pursue him through his subsequent career. An anecdote of his last days, and we have done with Pierre Simon Laplace.

"You have made many splendid discoveries, marquis," said a friend to him as he lay on his death-bed.

"What we know is a little matter," the dying philosopher murmured, "what we do not know is immense."

Of Dominique François Jean Arago, the celebrated astronomer, and equally celebrated friend of Humboldt, no sketch is necessary here, as most readers are familiar with his biography. It will be sufficient to say that he was at this time engaged in measuring the arc of the meridian, a famous and dangerous epoch in his life. Of Biot, and Gay-Lussac—their balloon ascensions, and magnetic experiments, we have already spoken.

Among these men, and others of less note, minor lights in the constellation of science, Humboldt took his place, as a star of the first magnitude. He was undoubtedly surpassed by some of them in particular departments of study, but in general knowledge, a knowledge of all branches of science, and all literatures, he had no superior, if indeed an equal. There was no sense of inferiority on his part; he was a king among his peers.

Once fairly settled in Paris, he sat down and mapped out his great work. Had a book of travels been his object, it would not have been difficult for him to have written

it within a reasonable time: many a traveller would have done so, while Humboldt was thinking about it. A book of travels, however, was not his object, at any rate not his sole object, it was but a small portion of the task which he contemplated. He would do himself justice as a traveller by describing the scenes through which he had passed; the ocean over which he had sailed; the forests in which he had wandered: the rivers he had explored; the mountains he had ascended; the ruins he had seen; but he would also do himself justice as a man of science. He would give the geography, the geology, the botany, in short, the natural history of the New World; not in a general way, from the vague reports of others, but from his own conscientious observations and researches. Clearly this was a Herculean task.

He divided his material into six portions. First, the narrative of his journey; then its zoology and anatomy; then its political aspect. These were followed by its astronomy and magnetism, its geology, and its botany. Knowing that he could not, without assistance, write the multitude of books that such a treatment of his travels implied, he parcelled the different portions around among his friends. Arago and Gay-Lussac were to assist him in chemistry and meteorology: Latreille and Cuvier in anatomy: Laplace in mathematics: Vauquelin and Klaproth in mineralogy; and Bonpland and Kunth,—(not our old friend, and his boyish tutor, Christian, but Charles Sigismund Kunth, Professor of Botany in the University of Berlin) in botany. For his own part he would superintend their labours, and write the narrative of his journey. And now to work, Messieurs!

To work they went.

As Humboldt laid out his works with great regularity, the reader may suppose that the same regularity attended their publication: but it was not so Not all those that related to, and completed one branch of science, appeared at one time: they were published as they were written. It could not well have been otherwise when so many hands were at work.

To know the years in which Humboldt's books were published, is to know the nature of his employment at that time. With this clue before us we shall trace him during his life in Paris. He came thither, the reader will remember, in the autumn of 1807. 1808 was a busy year with him. It witnessed the publication of two editions of his "Aspects of Nature," one in German, the other in French; of a work on latitude and longitude, in Latin; of a work on electric fish, in German, and of the first volume of his work on the equinoctial plants. This last publication, an immense folio, with pages two feet, or thereabouts, in length, was the first of a series of works of the same size and kind. They were mostly written in Latin, some by Humboldt, others by Bonpland and Kunth.

In the preface to the first volume of "Equinoctial Plants," which preface, by the way, was written before Humboldt visited his brother William at Albano, (it is dated at Paris, March 1, 1805) he speaks of the labours to which Bonpland and himself were devoted during their five years' travels, and says that botanical researches were those with which they occupied themselves most assiduously. A great part of the countries through which they passed had never been visited by botanists. Don Jose Celestino Mutis, director of the botanical expedi-

tion of New Grenada, whom Humboldt met at Bogota, where he was royal astronomer, and to whom he dedicated the "Equinoctial Plants," had examined before them the forests of Turbaco, and the banks of the Rio Magdalena; he did not penetrate, however, the mountains of Quindiu, where they obtained some of their rarest botanical specimens. Only one traveller, Joseph de Jussieu, had preceded them at Loxa. Ruiz and Pavon had examined some portions of Peru, but not the province of Jaen de Bracamorras, where the vegetation was richest. Cervantes, Sessé and Mocino had made many researches in Mexico, but nature was so unexhaustible in that immense territory that Humboldt and Bonpland obtained many specimens, not known to those botanists.

The number of equinoctial plants which the travellers collected in both hemispheres amounted to six thousand two hundred different species, many of which were not previously known in botany. Their collection surprised the most celebrated botanists, it contained so many new specimens. In palms, gramines, and cryptogrames, three families of plants much neglected by former botanists, it was especially rich.

The "Equinoctial Plants" bore on the title page the names of Humbolt and Bonpland as its authors. Most of the work, however, was written by Bonpland, who was highly complimented by Humboldt. His praise of his fellow-traveller was as sincere as it was beautiful. "If my enterprise," he said, "shall one day be regarded as interesting in the progress of botany, the success will be almost entirely owing to the active zeal of M. Bonpland." The work was embellished with a great number of designs, which were carefully engraved by Sellier.

The second volume of the "Equinoctial Plants" was published in 1809.

This, and the two following years, found Humboldt hard at work. He had not yet decided, it would seem, upon writing a regular narrative of his travels, or, deciding, had postponed it for a few years longer, until he could see his way more clear before him. He would first work up some of his lighter materials. His portfolio was full of sketches; his journals were overflowing with astronomical observations. He entrusted the latter to Oltmans, a young geometrician of Berlin, who revised them and made all the calculations anew, employing the lunar tables of Berg, and correcting them at the same time by the passage of the moon over the meridian. The Institute of France recognised the seven hundred positions calculated in this manner as the greatest mass of materials for astronomical geography then existing, and awarded to Oltmans, in 1809, the prize for astronomy. His work, "A Collection of Astronomical Observations, Trigonometric Operations, and Barometric Measurements," was published in 1810, in two quarto volumes. Humboldt's own publication this year was the "Picturesque Atlas." This was another of his great folios, and undoubtedly the most attractive one to general readers. It is not scientific, like the "Equinoctial Plants," and his other botanical works in folio, but descriptive and historical—a sort of sketch-book of the New World. It is illustrated by sixty-nine engravings, executed by the best artists in Paris, Rome, and Berlin—such men as Gmelin, Wachsmann, Pinelli, and Massard, the elder. Many of these engravings were made from Humboldt's own sketches, which were taken on the spots represented.

The popularity of the folio "Picturesque Atlas" induced Humboldt to issue a less expensive edition in 12mo. The title of the folio "Picturesque Atlas" was dropped, and its sub-title, "Views of the Cordilleras, and Monuments of the Native People of America," substituted instead. It soon became a favourite book.

If the reader were to imagine Humboldt at this time, he would doubtless picture him as a man absorbed in his pursuits, and inattentive to everything else; his mind pre-occupied, his memory burdened, his days and nights devoted to thought. He would picture him in his study, with quires of white paper before him, a pen in his hand, and the floor strewn with pages of blotted manuscript. Or, in the alcoves of some great library, taking down ponderous folios or quartos to settle some knotty point. This, we believe, is the usual *beau ideal* of a scholar, and in many cases it happens to be the true one. For Humboldt it will not answer. It is true that he read deeply in the public libraries of Paris, and wrote unweariedly in his private study, turning quires and reams of paper into manuscript. The manuscript was not blotted, however, for his handwriting was singularly clean, neat, and lady-like in its delicacy; nor was his memory burdened, or his mind pre-occupied. He possessed himself too thoroughly to be oppressed by his work; his nature was large enough to rise above it, gigantic as it was. He would as soon have gone into society with ink on his fingers, as to have betrayed himself as a scholar by any of the cheap signs of scholarship. With the scholar's love of solitude, he had a woman's love of society. He loved it, not because it flattered his vanity, for he had no vanity; but because his nature was emi-

nently a social one, and because it revived and refreshed him in his labours, and sharpened his insight into life and man. Like his friend Goethe, he was a man of the world, in the noblest sense of that much-abused term. He loved to meet and converse with the distinguished men and women who filled the *salons* of Paris. Even its frivolous characters, the light-headed and light-heeled crowd, were not despised by him. He amused himself at their expense occasionally, but it was in such a pleasant manner that they could not be angry. He had a vein of genial humour in him, and, when the occasion demanded it, a biting wit. The worst that could be said of him was, that he was a little sarcastic.

"In the *salons* of Metternich," says Varnhagen Von Ense, who met him at Paris, in 1810; "in the *salons* of Metternich (at that time Austrian ambassador near the Court of St. Clond), I saw Humboldt only as a brilliant and admired meteor, so much so, that I hardly found time to present myself to him, and to whisper in his ear a few of those names which gave me a right to a personal acquaintance with him. Rarely has a man engaged in such a degree the esteem of all, the admiration of most opposite parties, and the zeal of all in power to serve him. Napoleon does not love him. He knows Humboldt as a shrewd thinker, whose way of thinking, and whose opinion can not be bent; but the Emperor and his Court, and the high authorities have never denied the impression which they received by the presence of this bold traveller, by the power of knowledge, and the light which seems to stream from it in every direction. The learned of all nations are proud of their high asso-

ciate, all the Germans of their countryman, and all the liberals of their fellow.

"It has been rarely vouchsafed to a man in such degree as to Humboldt, to stand forth in individual independence and always equal to himself, and at one and the same time, in scientific activity, and in the widest social and international intercourse, in the solitude of minute inquiry, and in the almost confusing brilliancy of the society of the day: but I know of no one who, with all this, has endeavoured throughout his whole life to promote the progress and welfare of our race, so steadily, uniformly, and with such ample success."

Humboldt published three works in 1811; one in German, on the Geography of Plants, another, or rather the first volume of another, in French, on Zoology and Anatomy, and another, also in French, on Mexico. It was his "Political Essay on the Kingdom of New Spain."

The title of this celebrated work gives but a poor indication of its contents. It is not only a political essay in the amplest sense of the word, but a geographical, mineralogical, agricultural, and ethnological picture of Mexico, as it appeared to Humboldt at the time of his visit. It is divided into six grand sections or books. The first is taken up with general considerations of the extent and physical aspect of the country. The second treats of the general population and division of the castes. The third presents a particular statistical view of the intendancies, their population, and area. He discusses in the fourth book the state of agriculture, and of the metallic mines; and in the fifth, the progress of manufactures and commerce. The sixth contains researches into the revenues of the state, and the military defence of the country.

To obtain, as he did, during his year s life in Mexico, the material necessary for such a work, did not imply much idleness either on his part, or that of Bonpland. For they worked in concert, Bonpland taking the botanical and agricultural portions, and Humboldt those that related to geography and geology. He also drew up a minute map of the whole country, or rather a series of maps, in most cases from his own surveys and measurements. He determined the position of the capital, and of most of the principal cities and towns; the height above the sea of the different table lands, mountains, and volcanoes: the configuration of lakes and the windings of rivers: and above all, the exact situation of the hundreds of mines, with which Nature has blessed, or cursed, that rich but unfortunate country.

Humboldt was led to this undertaking by the Director of the Royal School of Mining, who had long been collecting facts regarding the position of the Mexican mines, and the districts into which they were divided. He was desirous of having a detailed map, on which the most noted mines should be marked, constructed for the use of the Tribunal of Mines. Such a labor was necessary, he thought, both for the administration of the country, and for those who wished to know its resources. The city of Guanaxuato, for instance, was not on most of the maps published in Europe, although it contained seventy thousand inhabitants, and some of the richest mines in Mexico. Neither were Bolanos, Sombrete, Batopilas and Zimapan mentioned. The position of the Real de Catorce in the intendancy of San Louis Potosi was not indicated, although it yielded annually $4,000,000.

The "Political Essay on the Kingdom of New Spain"

was dedicated to the King of Spain. How his Catholic Majesty received the work, which, on the whole flattering to his government of Mexico, was still truth-telling when it came to speak of its defects, we are not told. It was eagerly read in France, and immediately translated into English, the English version appearing simultaneously in London and New York. The English and American public were anxious to see what Humboldt had to say concerning Mexico; familiar with his reputation as a traveller and a naturalist, they were curious to see him in the character of a political economist. That he satisfied their expectations the reviews of the day testify.

In the autumn of 1810 William Von Humboldt, who, since we left him at Albano, had been appointed by the King of Prussia Councillor of State in the Ministry of Home Affairs, and Chief of the Section of Religion and Public Instruction, went as Extraordinary Ambassador to the Court of Vienna. There, as at Rome and Paris, he was surrounded with authors, artists, and statesmen, such men as Metternich and Schlegel, and Korner, the youthful Theodore Korner, who was soon to lay down his lyre, and take up his sword. But a greater celebrity soon appeared. It was his brother Alexander, who had left Paris after the publication of the first portions of his American travels, to take leave of his family before he started on another great journey. The Minister Romanzow had proposed to him to accompany a Russian mission across Kashghor to Thibet, and, delighted with the idea, he had at once accepted. He could now visit the mountains of India, and compare them with the Cordil leras of America.

But it was not to be, for France and Russia were at war. The ill wind that had so often crossed his path when a scheme of travel was on foot, blew him back to Paris. Disappointed, but not disheartened, he resumed his labours. They were not much lightened by the books he had published, for his great book, the personal narrative of his travels, was still to be written. In addition to the labour which this implied, he assumed another, the task of learning Persian. Considering his projected journey to Asia as merely postponed, not abandoned, he set about fitting himself for it. It was his intention to proceed to India, by the way of Teheran or Herat, at his own expense.

He returned to Paris on the breaking out of the war in 1812, and for two years the public knew nothing of him. He forsook the *salons*, and was seldom seen in the chambers of his scientific associates. Even his old friend Bonpland, to whom Napoleon had granted a pension, and whom Josephine, whose heart he had won by a collection of flower-seeds from the West Indies, had made intendant of Malmaison, saw but little of him. He was busy with his travels, finishing from memory and imagination his wonderful picture of the tropics. How he must have enjoyed reading his journals, written on the spur of the moment years before; this page on the deck of the Pizarro, with the sea around him, that on the crater of Teneriffe, with the heavens above him, and that in Caracas, dear dangerous Caracas, which an earthquake had just tumbled in ruins! It was as good as a second journey to the tropics. It was eight years since his return to Europe, and during all that time he had brooded over his task. He had written much, as the reader has seen—

great scientific works on botany, zoology, and astronomy, and a profound political essay on the resources of a kingdom; but with the exception of a few slight sketches in his "Picturesque Atlas," nothing that showed his marvellous power of description, or could be considered as an approach to a narrative of his travels. He was making up for lost time now, if an epoch so fruitful in books can be called lost time, delighting his heart and wearying his fingers with his task. He wrote, and wrote, and wrote, turning the quires and reams of blank paper, with which our fancies have furnished him, into pages of the neatest manuscript that ever came from an author's study. His fingers, indeed, might ache, but he was never tired of his labour of love. Neither was he discouraged at the good-natured banter of Arago, who told him that he did not know how to write. "You write without end, *mon cher ami*, but that is not a book; it is a picture without a frame."

The first volume of his travels appeared in 1814. It was entitled "A Voyage to the Equinoctial Regions of the New Continent."

We shall not criticise this remarkable book, of which the reader has by this time formed an opinion, but let Humboldt speak for himself, by culling a few paragraphs from his introduction. It is one of his most masterly productions, fresh, clear, and philosophical, with a charming vein of autobiography.

"Many years have elapsed since I quitted Europe, to explore the interior of the New Continent. Devoted from my earliest youth to the study of nature, feeling with enthusiasm the wild beauties of a country guarded by mountains and shaded by ancient forests, I expe-

rienced in my travels, enjoyments which have amply compensated for the privations inseparable from a laborious and often agitated life. These enjoyments, which I endeavoured to impart to my readers in my 'Remarks upon the Steppes,' and in the 'Essay on the Physiognomy of Plants,' were not the only fruits I reaped from an undertaking formed with the design of contributing to the progress of natural philosophy. I had long prepared myself for the observations which were the principal object of my journey to the torrid zone. I was provided with instruments of easy and convenient use, constructed by the ablest makers, and I enjoyed the special protection of a government which, far from presenting obstacles to my investigations, constantly honoured me with every mark of regard and confidence. I was aided by a courageous and enlightened friend, and it was singularly propitious to the success of our participated labour, that the zeal and equanimity of that friend never failed, amidst the fatigues and dangers to which we were sometimes exposed.

"Under these favourable circumstances, traversing regions which for ages have remained almost unknown to most of the nations of Europe, I might add even to Spain, M. Bonpland and myself collected a considerable number of materials, the publication of which may throw some light on the history of nations, and advance the study of nature.

"I had in view a two-fold purpose in the travels of which I now publish the historical narrative. I wished to make known the countries I had visited; and to collect such facts as are fitted to elucidate a science of which we as yet possess scarcely the outline, and which has

been vaguely denominated Natural History of the World, Theory of the Earth, or Physical Geography. The last of these two objects seemed to me the most important. I was passionately devoted to botany and certain parts of zoology, and I flattered myself that our investigations might add some new species to those already known, both in the animal and vegetable kingdoms; but preferring the connection of facts which have been long observed, to the knowledge of insulated facts, although new, the discovery of an unknown genus seemed to me far less interesting than an observation on the geographical relations of the vegetable world, on the migrations of the social plants, and the limit of the height which their different tribes attain on the flanks of the Cordilleras.

"When I began to read the numerous narratives of travels, which compose so interesting a part of modern literature, I regretted that travellers, the most enlightened in the insulated branches of natural history, were seldom possessed of sufficient variety of knowledge to avail themselves of every advantage arising from their position. It appeared to me, that the importance of the results hitherto obtained did not keep pace with the immense progress which at the end of the eighteenth century, had been made in several departments of science, particularly geology, the history of the modifications of the atmosphere, and the physiology of animals and plants. I saw with regret (and all scientific men have shared this feeling), that whilst the number of accurate instruments was daily increasing, we were still ignorant of the height of many mountains and elevated plains; of the periodical oscillations of the aërial ocean; of the

limit of perpetual snow within the polar circle and on the borders of the torrid zone; of the variable intensity of the magnetic forces, and of many other phenomena equally important.

"Maritime expeditions and circumnavigatory voyages have conferred just celebrity on the names of the naturalists and astronomers who have been appointed by various governments to share the dangers of those undertakings; but though these eminent men have given us precise notions of the external configuration of countries, of the natural history of the ocean, and of the productions of islands and coasts, it must be admitted that maritime expeditions are less fitted to advance the progress of geology and other parts of physical science, than travels into the interior of a continent. The advancement of the natural sciences has been subordinate to that of geography and nautical astronomy. During a voyage of several years, the land but seldom presents itself to the observation of the mariner; and when, after lengthened expectation, it is descried, he often finds it stripped of its most beautiful productions. Sometimes, beyond a barren coast, he perceives a ridge of mountains covered with verdure, but its distance forbids examination, and the view serves only to excite regret.

"Journeys by land are attended with considerable difficulties in the conveyance of instruments and collections, but these difficulties are compensated by advantages which it is unnecessary to enumerate. It is not by sailing along a coast that we can discover the direction of chains of mountains, and their geological constitution, the climate of each zone, and its influence on the forms and habits of organized beings. In proportion to the

extent of continents, the greater on the surface of the soil are the riches of animal and vegetable productions; the more distant the central chain of mountains from the sea-shore, the greater is the variety in the bosom of the earth, of those stony strata, the regular succession of which unfolds the history of our planet. As every being considered apart is impressed with a particular type, so, in like manner, we find the same distinctive impression in the arrangement of brute matter organized in rocks, and also in the distribution and mutual relations of plants and animals. The great problem of the physical description of the globe, is the determination of the form of these types, the laws of their relations with each other, and the eternal ties which link the phenomena of life, and those of inanimate nature."

He next states the objects that he had in view in his expeditions, and gives a *resumé* of his collections and observations, and the various scientific publications to which they gave use, and continues:

"After having distributed into separate works all that belongs to astronomy, botany, zoology, the political description of New Spain, and the history of the ancient civilization of certain nations of the New Continent, there still remained many general results and local descriptions which I might have collected into separate treatises. I had, during my journey, prepared papers on the races of men in South America; on the Missions of the Orinoco; on the obstacles to the progress of society in the torrid zone arising from the climate and the strength of vegetation; on the character of the landscape in the Cordillera of the Andes, compared with that of the Alps of Switzerland; on the analogies between the rocks of the two hemispheres; on the phy-

sical constitution of the air in the equinoctial regions, &c. I had left Europe with the firm intention of not writing what is usually called the historical narrative of a journey, but to publish the fruit of my inquiries in works merely descriptive; and I had arranged the facts, not in the order in which they successively presented themselves, but according to the relation they bore to each other. Amidst the overwhelming majesty of Nature, and the stupendous objects she presents at every step, the traveller is little disposed to record in his journal matters which relate only to himself, and the ordinary details of life.

"I composed a very brief itinerary during the course of my excursions on the rivers of South America, and in my long journeys by land. I regularly described (and almost always on the spot) the visits I made to the summits of volcanoes, or mountains remarkable for their height; but the entries in my journal were interrupted whenever I resided in a town, or when other occupations prevented me from continuing a work which I considered as having only a secondary interest. Whenever I wrote in my journal, I had no other motive than the preservation of some of those fugitive ideas which present themselves to a naturalist, whose life is almost wholly passed in the open air. I wished to make a temporary collection of such facts as I had not then leisure to class, and note down the first impressions, whether agreeable or painful, which I received from nature or from man. Far from thinking at the time that those pages thus hurriedly written would form the basis of an extensive work to be offered to the public, it appeared to me, that my journal, though it might furnish certain data useful to science, would present very

few of those incidents, the recital of which constitutes the principal charm of an itinerary.

"The difficulties I have experienced since my return, in the composition of a considerable number of treatises, for the purpose of making known certain classes of phenomena, insensibly overcame my repugnance to write the narrative of my journey. In undertaking this task, I have been guided by the advice of many estimable persons, who honour me with their friendship. I also perceived that such a preference is given to this sort of composition, that scientific men, after having presented in an isolated form the account of their researches on the productions, the manners, and the political state of the countries through which they have passed, imagine that they have not fulfilled their engagements with the public, till they have written their itinerary.

"An historical narrative embraces two very distinct objects; the greater or the less important events connected with the purpose of the traveller, and the observations he he has made during his journey. The unity of composition also, which distinguishes good works from those on an ill-constructed plan, can be strictly observed only when the traveller describes what has passed under his own eye; and when his principal attention has been fixed less on scientific observations than on the manners of different people and the great phenomena of nature. Now, the most faithful picture of manners is that which best displays the relations of men towards each other. The character of savage or civilized life is portrayed either in the obstacles a traveller meets with, or in the sensations he feels. It is the traveller himself whom we continually desire to see in contact with the objects which surround

him; and his narration interests us the more, when a local tint is diffused over the description of a country and its inhabitants. Such is the source of the interest excited by the history of those early navigators, who, impelled by intrepidity rather than by science, struggled against the elements in their search for the discovery of a new world. Such is the irresistible charm attached to the fate of that enterprising traveller (Mungo Park), who, full of enthusiasm and energy, penetrated alone into the centre of Africa, to discover amidst barbarous nations the traces of ancient civilization.

"In proportion as travels have been undertaken by persons whose views have been directed to researches into descriptive natural history, geography, or political economy, itineraries have partly lost that unity of composition, and that simplicity which characterized those of former ages. It is now become scarcely possible to connect so many different materials with the detail of other events; and that part of a traveller's narrative which we may call dramatic gives way to dissertations merely descriptive. The numerous class of readers who prefer agreeable amusement to solid instruction, have not gained by the exchange; and I am afraid that the temptation will not be great to follow the course of travellers who are encumbered with scientific instruments and collections.

"To give greater variety to my work, I have often interrupted the historical narrative by descriptions. I first represent phenomena in the order in which they appeared; and I afterwards consider them in the whole of their individual relations. This mode has been successfully followed in the journey of M. de Saussure, whose most valuable work has contributed more than

any other to the advancement of science. Often, amidst dry discussions on meteorology, it contains many charming descriptions; such as those of the modes of life of the inhabitants of the mountains, the dangers of hunting the chamois, and the sensations felt on the summit of the higher Alps.

"There are details of ordinary life which it may be useful to note in an itinerary, because they serve for the guidance of those who afterwards journey through the same countries. I have preserved a few, but have suppressed the greater part of those personal incidents which present no particular interest, and which can be rendered amusing only by the perfection of style.

"With respect to the country which has been the object of my investigations, I am fully sensible of the great advantages enjoyed by persons who travel in Greece, Egypt, the banks of the Euphrates, and the islands of the Pacific, in comparison with those who traverse the continent of America. In the Old World, nations and the distinctions of their civilization form the principal points in the picture; in the New World, man and his productions almost disappear amidst the stupendous display of wild and gigantic nature. The human race in the New World presents only a few remnants of indigenous hordes, slightly advanced in civilization; or it exhibits merely the uniformity of manners and institutions transplanted by European colonies to foreign shores. Information which relates to the history of our species, to the various forms of government, to monuments of art, to places full of great remembrances, affect us far more than descriptions of those vast solitudes which seem destined only for the development of vegetable life, and

to be the domain of wild animals. The savages of America, who have been the objects of so many systematic reveries, and on whom M. Volney has lately published some accurate and intelligent observations, inspire less interest since celebrated navigators have made known to us the inhabitants of the South Sea islands, in whose character we find a striking mixture of perversity and meekness. The state of half-civilization existing among those islanders gives a peculiar charm to the description of their manners. A king, followed by a numerous suite, presents the fruits of his orchard; or a funeral is performed amidst the shade of the lofty forest. Such pictures, no doubt, have more attraction than those which pourtray the solemn gravity of the inhabitant of the banks of the Missouri or the Maranon.

"America offers an ample field for the labours of the naturalist. On no other part of the globe is he called upon more powerfully by nature to raise himself to general ideas on the cause of phenomena and their mutual connection. To say nothing of that luxuriance of vegetation, that eternal spring of organic life, those climates varying by stages as we climb the flanks of the Cordilleras, and those majestic rivers which a celebrated writer (Chateaubriand) has described with such graceful accuracy, the resources which the New World affords for the study of geology and natural philosophy in general have been long since acknowledged. Happy the traveller who may cherish the hope that he has availed himself of the advantages of his position, and that he has added some new facts to the mass of those previously acquired!

"Since I left America, one of those great revolutions,

which at certain periods agitate the human race, has broken out in the Spanish colonies, and seems to prepare new destinies for a population of fourteen millions of inhabitants, spreading from the southern to the northern hemisphere, from the shores of the Rio de la Plata and Chile to the remotest part of Mexico. Deep resentments, excited by colonial legislation, and fostered by mistrustful policy, have stained with blood regions which had enjoyed, for the space of nearly three centuries, what I will not call happiness but interrupted peace. At Quito several of the most virtuous and enlightened citizens have perished, victims of devotion to their country. While I am giving the description of regions, the remembrance of which is so dear to me, I continually light on places which recall to my mind the loss of a friend.

"When we reflect on the great political agitations of the New World, we observe that the Spanish Americans are by no means in so favourable a position as the inhabitants of the United States; the latter having been prepared for independence by the long enjoyment of constitutional liberty. Internal dissensions are chiefly to be dreaded in regions where civilization is but slightly rooted, and where, from the influence of climate, forests may soon regain their empire over cleared lands if their culture be abandoned. It may also be feared that, during a long series of years, no foreign traveller will be enabled to traverse all the countries which I have visited. This circumstance may perhaps add to the interest of a work which pourtrays the state of the greater part of the Spanish colonies at the beginning of the nineteenth century. I even venture to indulge the hope that this work will be thought worthy of attention when passions shall be

hushed into peace, and when, under the influence of a new social order, those countries shall have made rapid progress in public welfare. If then some pages of my book are snatched from oblivion, the inhabitant of the banks of the Orinoco and the Atabapo will behold with delight populous cities enriched by commerce, and fertile fields cultivated by the hands of free men, on those very spots where, at the time of my travels, I found only impenetrable forests and inundated lands."

Such was the plan that Humboldt proposed to himself when he sat down to write the historical relation of his travels, and he succeeded perfectly. He produced the finest book of travels ever written. As picturesque as the most perfect masters of description, no writer, living, or dead, ever approached him in varied and profound knowledge—in what may be called the philosophy of nature. He is nature's own philosopher. Nearly fifty years have elapsed since the publication of his "Voyage;" men and manners have changed, and taste with them; what was a mere groping after knowledge then, is a grasping of it now: similar books have been written, and excellent ones, too: yet he still holds his ground with all classes of readers. Nay, he has gained ground, for his book was never so popular as at present.

From 1814 to 1819, when the second volume of the "Voyage" was published, Humboldt continued his literary labours, writing a number of works, mostly scientific. In 1815, he published the first volume of the "New Genera and Species of Plants." It was a great folio, similar to the "Equinoctial Plants." Like that it was written in Latin, and chiefly by Kunth, to whom he

had committed his botanical collections, Bonpland being, as we have seen, at Malmaison. A kindred work appeared in 1816, the "Monography of Melastomes." This year was marked by two other publications, a map of the Rio Magdalena, and a paper "On the Mountains of India, "the result of his oriental studies. In 1817, he published the second volume of the "New Genera and Species of Plants," his celebrated essay on the "Isothermal Lines," and two Latin treatises, one on the "Geographical Distribution of Plants," the other on the "Nature of the Family of Gramines." In 1818, appeared the third volume of the "New Genera," and a "Memorial upon the Settlement of the Limits of French and Portuguese Guiana."

Busy during all these years with the works that we have enumerated, Humboldt still found time to write in the scientific reviews of France and Germany. From his early years, as far back as when he was superintendent of mines at Bayreuth and Anspach, he was in the habit of contributing to them. His first papers appeared in the "Mining Journal" of Von Moll, in Köhler and Hoffman's "Journal," and in Crell's "Chemical Annals:" his later ones in the "Journal of Natural History," in the "Annals of Chemistry," and the "Memoirs of the Society of Arcueil."

The Society of Arcueil was a scientific association, composed of some of the most distinguished *savans* of Paris. It took its name from the place at which they assembled—Arcueil, a little village on the Bièvre, three or four miles from Paris. A favourite holiday resort of the Parisians, it was the abode of Laplace and Berthollet, the founders of the society. Its members were Biot,

Gay-Lussac, Thénard, Decandolle, Collet, Descotils, Malus, A. B. Berthollet, and Humboldt. They met once a fortnight at the house of Berthollet, and spent the day together, giving each other the results of their studies and experiments, reading the scientific papers that they had composed since their last meeting, or in pleasant rambles about the neighbourhood. Most of these men were members of the Institute of France, and the papers that they read at Arcueil, were delivered before that august body, and afterwards published in the "Memoirs" of the society. To this work, which extended to several volumes, Humboldt was a constant contributor. In conjunction with Biot, he wrote the opening paper of the first volume—(published in 1807)—a treatise on magnetic observations, to the second (published in 1809) he contributed a curious paper, on the respiration of fishes, the result of a great number of experiments, made by himself and Provençal.

It is a happy thing for a busy man, whose days are passed in the noise and dust of cities, to have a pleasant neighbourhood within reach, "a city of refuge," as it were, to which he can retreat now and then, and meet a few friends, and refresh his jaded spirit. Such was Arcueil to the busy Humboldt, who spent many delightful days in its quiet shades. The friends that he met there were the most congenial that he could have chosen, the world over; each distinguished for some pursuit with which he sympathized, and all united in the interests of science. It was a pleasure to him to read his papers to them, and what is not always the case in these matters, a pleasure to listen to theirs in turn. They met, as we have said, at the house of Berthollet; but, as the house

of Laplace was near by, the gardens of the two *savans* adjoining each other, they were as often at Laplace's as at Berthollet's. They could not but profit by the conversations of the old mathematician, for he was profoundly versed in all the sciences; besides, he had seen much of the world, and was full of anecdotes of bygone times and men. He could tell them of D'Alembert, Diderot, and the Encyclopedaists,—the master-spirits of the eighteenth century. If the conversation turned, as was likely, on Descartes or Newton, their portraits hung in his study, as did also those of Euler, and poor old blind Galileo. If they wished to walk he accompanied them. Arm-in-arm, discussing what was uppermost in their minds, they wandered around the neighbourhood, now in the fields and meadows, or along the banks of the Bièvre; and now by the ruins of the aqueduct built by the Emperor Julian, in the olden time, to convey water to his palace in Paris. There was no end of pleasant rambles at Arcueil.

In addition to the best literary and scientific society in Paris, Humboldt met from time to time, many of his German friends. Among others who were present there in 1814 was A. W. Schlegel, and his brother William. Napoleon had fallen, the Bourbons were restored, and the different Powers sent their ambassadors to congratulate them. William came as the ambassador of Prussia. He had ascended several rounds of the political ladder since he left Albano, as Alexander himself might have done, had he wished. Soon after the latter settled in Paris, in 1807, and again in 1809, he filled a political mission there, near the person of Frederick William, the Prince of Prussia. When the conferences were over at

Paris, the Prince Regent of England invited the assembled crowned heads and their courts to visit England. Alexander accompanied the Prussian embassy to London, where he remained some weeks.

About this time, on the 29th of May, 1814, his old friend, Bonpland, suffered a severe loss in the death of the Empress Josephine. He was by her bed when she died. When Napoleon abdicated he was advised by Bonpland to retire to Mexico, and await there the course of events; but the great disturber of nations was still confident of his star. He could not foresee its fatal setting on the bloody field of Waterloo. Bonpland might have remained at Malmaison, under the new dynasty; he was even solicited to do so by Prince Eugene, but he refused. It was no place for him, since the death of his beloved mistress. He remained with Humboldt till the close of 1816, when he sailed from Havre to Brazil, carrying with him a collection of useful plants and European fruit trees. As soon as he arrived at Buenos Ayres the Brazilian government offered him the post of Professor of Natural History, but some intrigue or slander, what was never known, changed their feelings towards him, and he tendered his resignation. He was not allowed to show his collections, which would have conferred a greater benefit on the country than on himself; he was even refused a place to lecture in. Dispirited by such ill treatment, but as eager as in his youth to explore new lands, and to discover new plants and flowers, he started on an expedition into the interior. Such was the tenor of his letters to Humboldt.

In August or September, 1818, Humboldt made his third visit to England, where his brother William was

residing as Prussian ambassador. His stay was short, for he was in Paris during both these months. We get glimpses of him at this time, as of other French celebrities, in the flippant but amusing diary of Lady Morgan. Writing from Paris in August, to her sister Lady Clarke, she gossips in this fashion:

"We found dear Dénon surrounded by English fashionables, from whom he rushed, when we were announced, into our arms alternately. We met at dinner chez Madame d'Houchien, who received us like her children. We found some of the old habitués there; but Dénon and Morgan set me down at our hotel early in the evening, I was so tired, and they proceeded to the Bishop of Blois (Grégoire.) The bishop actually embraced him, heretic as he was, before all the company, although there were two Italian bishops present, praised my work on 'France,' and assured him it had done infinite good. You may, therefore, be perfectly easy about us. We are to dine to-morrow with Dénon. Humboldt asked to meet us."

At the commencement of September her ladyship walked to the *Barbe bleue*, *Marché des Innocents*, where she bought herself a *chapeau de soleil*, with corn flowers stuck in the side of it—a regular Leghorn—twenty francs. She then went to *Eaubonne* to see poor dear Madame Ginguené, but not finding her at home, she drove to Montmorenci, where she dined deliciously for four francs. On her return she found that Humboldt had called upon her during her absence. He left a little billet, instead of a card.

"Le Baron De Humboldt est venu s'informer du retour bien tardif de Sir Charles et Lady Morgan."

On the 10th of September she writes Lady Clarke, from the chateau of Lafayette, at La Grange, and among other feminine tattle says, "The general has proposed inviting Humboldt and Dénon to join us. If they come, Europe could scarcely present such another circle of talent and celebrity."

A month later at Paris she again mentions Humboldt, this time in her diary.

"Humboldt had called, and, as usual, had written his scrap in the porter's lodge. The poor porter! had he known the value of this autograph he would have pilfered it; and what renders it more curious, it is writter on the back of a milliner's card!"

Where could Humboldt have got that milliner's card, pray? Had he been buying a new bonnet for some of his lady acquaintances? Or was he thinking of studying the botany of artificial flowers? If the latter he must have found her Ladyship a rare specimen.

Another extract from the diary: no date: about the 30th of October.

"Humboldt has been again to-day, and again we were out. How very mortifying! His visits are none the less 'angels' visits' because they are not 'few or far between;' and certainly, so far as my acquaintance goes with the angelic choir, 'celui-là vaut bien les autres.' He left a precious little billet in the porter's lodge, where he wrote it: 'Alexandre Humboldt toujours assez malheureux de ne pas trouver Lady Morgan.'"

Another amusing extract from the diary: some time towards the end of November.

"*Thursday.*—I was sitting this morning for my picture

to Berthon, when the *frotteur* of the hotel, in the absence of my servant, threw open the door, and announced in one word, 'Lordvillanspence!' and enter the charming William Spencer, the poet-laureate of the aristocracy of London. What an agreeable surprise! He always brings a *bon-ton* London atmosphere about him. Berthon was charmed with the cordiality of our meeting, which, he thought, brightened up my countenance—which had hitherto expressed nothing but bore. He made Spencer sit down—*per far effetto*—whence I could see him, and kept poking my head with his mahl stick till, I am sure, my *pose* gave me the air of an illustration of the *petit courier des dames.* I took the opportunity of asking Spencer for a copy of his beautiful verses of 'Apology to Lady Anne Hamilton' for staying too late at her house, spell-bound by the eyes of the lovely Susan Beckford (afterwards the Duchess of Hamilton). He pretended to have forgotten them. I said that was an affectation unworthy of him; and I repeated the first verse myself:

> 'Too late I stayed—forgive the crime,
> For who could count the hours?
> For lightly falls the foot of time
> That only treads on flowers,' &c.

Berthon, affecting to be charmed with the metre, said, 'Mais traduisez moi cela, Miladi.' I began, 'J'ai resté trop tard l'autre soir,' but Spencer and I both burst out laughing, so that we could not proceed. Berthon looked confused. 'Oh!' said Spencer, in beautiful French, 'it is only nonsense worthy of Voiture; or the Hôtel Rambouillet.' 'Vraiment!' said Berthon, who had, most

likely, not heard of either one or the other, 'Attention, Miladi!'

"So he went on with his painting, and we fell into discourse, in English, on the *cancan* of May Fair, and into fashionable frivolities, and Miss Berry's last *mot*—'No friendship can cross the north of Oxford Street'—when a letter was delivered to me, on the outside of which was written, 'Alexandre Von Humboldt.' The dirty little spot called the world disappeared into its own mists, and the universe, of which Humboldt is at this moment the high-priest, seemed to replace the puppet-show with which we had been playing.

"Spencer begged the cover, and read out the letter, that my *pose* might not be disturbed; and Berthon said, looking at the picture through his hand, 'C'est un grand homme, M. Humboldt! J'ai ambition de faire son portrait, et de le mettre à l'exposition du Louvre avec le portrait de Miladi.'

"I promised to invite Spencer to the first Wednesday evening I expected Humboldt. This is Humboldt's letter:

"*From M. Humboldt to Lady Morgan.*

"'Thursday.

"'The pleasing remembrance of Sir Charles and Lady Morgan adds to the deep regret I felt at not having enjoyed their interesting conversation at Madame d'H.'s. My health is almost entirely re-established, and I shall hasten to present myself at Lady Morgan's residence to offer what is her due on so many claims, the homage of my sentiments of admiration and devoted respect

Alas! what pitiless judges I have in your beautiful Albion! You will permit me, I hope, to complain a little when you see how I am treated in the last number of the 'Quarterly Review.' But I have well deserved it.

"'HUMBOLDT.'"

Our next and last extract from the diary is the most Morganish of all. It shows us the sort of people with whom Humboldt mingled in his lighter moments, and with whom he amused himself, unbending his great nature in the intervals of his labours.

Towards the end of December, her ladyship, after dining with the "Doctrinaires," a political set of the day, set Morgan, who enjoyed an opera, serious or comic, beyond everything else in the world, down at the Opera Comique, and drove to the Faubourg St. Honoré to pay a visit to Madame de Houchien, who received in the charming easy French style every evening.

"Madame de Houchien had been a *dame d'atour* of the Empress Josephine, and her *salon* was Bonapartiste *tout pur*.

"Her *compères* this evening were no less than Dénon, Ségur, and M. de Mortemar, the latter creating groups out of a pack of cards scattered on the table. Well, the moment I mentioned where I had come from, *grande hilarité!*

"'Figurez vous,' said Madame de Houchien, 'the author of that *maudite* 'France,' popped down among these Solons and Lycurguses.'

"They insisted on hearing how I had *débûtéd*, and my irreverent question as to the religion *à la mode* was the

text to a most curious and interesting conversation, in which every one bore a part, and were well qualified to do so, as they knew all the chief actors, and, above all, the principal actresses at the Congress of Vienna (1814), where Madame de Krudener was the pythoness, and the Duchesses de Biron and de Bragazia were the secret oracles of Metternich, who won his spurs in their boudoirs.

"Lady Castlereagh (with whom, by-the-bye, some two or three years ago, I lived for three days every week—for she used to come to Lord Abercorn's whilst I was there every Saturday, and stopped till Monday), who was 'so innocent, dear chuck,' of the knowledge of all politics, that even that Mephistopheles of diplomacy, Talleyrand, gave her up in despair, though he tried his hand to turn her to account whilst she was at the Congress.

"'Oh,' said Dénon, 'Madame Krudener engrossed all influences. I remember her at the Congress, and later at Paris, when her *salons* were crowded with devotees and crowned heads. She was the greatest actress I ever saw—too melo-dramatic for a Clairon or a Mars, but quite good enough for an audience of kings and emperors; for royalty has loved the drama from Cæsar to Bonaparte.'

"'How was she dressed?' I asked—always a woman's first idea.

"'Well, in a flowing robe of white cashmere, or some soft fabric, but draped *artistiquement*, the folds gathered round her waist by a silver girdle, *des tresses dorées* flowing in profusion over a neck of alabaster. She had the air of having been flung on a crimson velvet sofa piled

with cushions—the sort of background a painter would have chosen for her. Always two or three crowned heads in attendance:—Alexander on one side, dressed to effect in black and diamonds; the King of Prussia, nowise remarkable except by contrast, on the other. On a low stool at the feet of the prophetess, sat her disciple, Bergasse, and her high priest, Jung Stilling.'

"'Ecoutez donc!' said Madame de Houchien, nudging me; 'est-il artiste, notre Dénon? Quelle groupe!'

"'Attendez, attendez!' said Dénon. 'In the midst of a solemn silence she rose, and extending her arms, exclaimed, with a strange and penetrating tone, '*Prions!*' Down on his knees went the Emperor of all the Russias, followed by everybody present, kings, aides-de-camp, and valets included.'

"'And this,' said Ségur, starting up, 'was the grandson of my great Catherine!'

"'You may well say *your* great Catherine,' said Dénon. 'What must the Prince de Ligne have thought on the occasion? He was present.'

"'Madame de Krudener must have had great talent,' said Madame de Houchien.

"'Pas le moins du monde,' said Dénon. 'She had art, the genius of mediocrity.'

"'Yes,' ventured I, 'she had religion for her aid; but she fought with the arms of St. Thérèse, who legislated for popes, and made princes do her bidding. Once you get into the spiritual, you have nothing to go by but faith; and Madame de Krudener had the greatest faith in Jung Stilling, as the Emperor Alexander had in her.'

"Here Humboldt was announced. I never hear his

name without rising with involuntary deference. His presence recals all that is most sublime in the capability of human nature. His gigantic labours, contrasted with the pleasant familiarity of his conversation, indicate the universality of the highest order of mind. He is like the elephant, who can with equal ease tear down an oak or pick up a pin! With me, he always 'picks up the pin,' and we fell into *persiflage* as usual. His frequent visits to my *salon*, and his great kindness to us, have not diminished the awe and reverence with which I first met him. He is reckoned very sarcastic, and given to mystification. Dénon put me *en garde* against this habit, on which I answered, 'Jalousie du métier.' And so I soon after took my leave, somewhat wearied, but highly delighted by the contrast of the two societies, 'Les hommes de la veille et les hommes de l'avenir.' I am glad, however, I was born soon enough to live among the former."

As we have given a specimen of one kind of light-writing, the reader may like to see another. It differs from the prattle of her ladyship, but is equally amusing in its way. It is from one of "the pitiless judges" of "beautiful Albion." Everybody remembers the brilliant opening of Judge Jeffrey's charge, in the Edinburgh Review, in the famous case of *The Excursion*—"This will never do;" and how signally his lordship's verdict has been reversed. Here is a similar case, from some unknown judge, sitting in the court of the Quarterly. It is to this that Humboldt playfully refers in his note, though he was mistaken in the number which contained the article. It appeared in the Quarterly for January, 1816, and was called forth by a translation of

the first volume of his "Voyage to the Equinoctial Regions."

"We have been rather tardy," his honour commences, "in directing our attention to the labours of this celebrated traveller; and we hardly know what excuse to offer for such apparent neglect towards so highly gifted a person. It is some consolation however to be able to state that our readers will lose but little from the delay; for, if we may be permitted to form a judgment from the two volumes now before us, and from two others under the title of 'Researches,' which we shall notice hereafter, the most material parts of all his former publications, have been, or will be, worked up anew, and in a less bulky form, in which some of them originally appeared.

"It is not the fault of M. de Humboldt, though it may be his misfortune, that he has fallen into the hands of injudicious friends, who speak of his pretensions in a tone of exaggerated panegyric that must pain a modest man, and shame a wise one: to term M. de Humboldt 'the first of travellers' is little; he is represented as one in whom may be found the rare union of all that Plato, Thales, and Pythagoras taught among the ancients—all that Montesquieu, Buffon, D'Alembert have written among the moderns. Astronomer, physiologist, antiquary, philologist, he superadds, it is said, to all these characters a profundity of wisdom in political economy, and an enlarged comprehension in the science of statistics, that would do honour to the first statesman of any age or country. Language like this has had its usual effects. It has made the subject of it impatient of just rebuke; and M. de Humboldt is disposed to be angry with us, because in our review of the Missionary Travels, (No.

xxvi. p. 325) we animadverted on his quoting a fact from a journal in which it did not exist, and which he now admits to be the case. We know nothing of that *unfriendly criticism*, of which he complains. M. de Humboldt may rest assured that we deprecate alike all bias of friendship or hostility towards the *person* of an author; but he may also rest assured that we shall use all possible freedom with his *works*, neither lavishly bestowing undeserved praise, nor wantonly scattering malicious and unjustifiable censure: we are disposed indeed to think highly of M. de Humboldt's acquirements; we admire his zeal and unwearied industry in collecting information, and his liberality in distributing it, but at the same time we have a duty to perform which will neither permit our senses to be ravished, nor our judgement swayed 'by the whistling of a name.'

"It would be great injustice, and a violation of the truth," his honour continues, cunningly blowing hot and cold at the same time, "not to allow to M. de Humboldt an extraordinary share of talent; his literary acquirements appear indeed to be more various than generally fall to the lot of man. To intellectual powers of the highest order, he adds an ardent and enthusiastic mind, full of energy and activity in the pursuit of knowledge. In the true spirit of enterprise and research we doubt if he has any superior; and it seems to be equally exerted on all occasions; the ardour of pursuit, the mental energy, and the bodily activity are as much in earnest in rummaging the shelves of a library, as in clambering up the sides of a volcanic mountain. He is well read in all the modern discoveries of astronomical, geological, and physiological science, but his book affords no evidence

that he is well grounded in chemistry and mineralogy, or in the principles and details of the several departments of natural history, with the exception of botany, in which he had an able assistant in M. Bonpland.

"M. de Humboldt however," his honour concludes, after giving a sketch of the traveller's journey as far as it was contained in the volume before him, or rather the volumes, for the first volume of the French edition was expanded into two in the translation; "M. de Humboldt however," his honour concludes, "has one good quality for a traveller; he is no egotist; he never offends by thrusting forward his own exploits, his own adventures, and his own 'hair-breadth escapes:' all the parade which he displays is in adorning science, in whose cause he is always eloquent; perhaps he may too frequently throw his cloak of wisdom over subjects that ages ago had descended to the vulgar, and thoughtlessly expend his powers on familiar objects that are generally understood. In a word we are persuaded that he aims at too much for any one man to accomplish; or, to make use of a nautical phrase, (we have been dealing in nautical matters) he spreads too much canvass, and carries too little ballast."

This curiosity of literature is a fair sample of scores of others which might be selected from the Quarterly at that time. Its proprietors paid their contributors liberally, and certain prejudices respected, left them free to slash as they pleased; the harder the better, it made the thing sell! It is instructive to turn over its back volumes, and see its treatment of many of the now famous names of the century; especially the poetical names. It trampled on the divine genius of Shelley: called dear old

Leigh Hunt a cockney, and was supposed to have killed "Johnny Keats." Far from killing Humboldt, its absurd attempt to slash his "Voyage" only amused him. The very extracts that the scribbler quoted, proved his own incompetency and malice. To think of Humboldt knowing nothing of mineralogy!

The origin of the difficulty between the traveller and the reviewer, for there *was* a difficulty, is to be found in the preceding volume of the Quarterly, in the number for July, 1815. It was this passage which occurs in a review of Campbell's "Travels in South Africa:"

"'Having heard,' says Mr. Campbell, 'of some paintings in Salakooto's house, we went after breakfast to view them. We found them very rough, representations of the camel-leopard, rhinoceros, elephant, lion, tiger, and stein buck, which Salakooto's wife had drawn on the clay wall, with white and black paint; however, they were as well done as we expected, and may lead to something better.'

"If any credit were due to the authority of M. Humboldt, they have already 'something better.' 'Mr. Trüter relates,' says the traveller, 'that in the southern extremity of Africa, among the Betjuanas, he saw children busy in tracing on a rock, with some sharp instrument, characters which bore the most perfect resemblance to the P and M of the Roman alphabet, notwithstanding which, these rude tribes were perfectly ignorant of writing.' No such passage, nor any allusion to such a circumstance occurs in the only journal which Mr. Trüter wrote; we take it upon ourselves to assert this positively, having examined the *original manuscript* with

great care. Yet this is a *fact* on which M. Humboldt hangs one of his numerous theories."

But enough of reviewers and tourists.

Humboldt's visit to London in the summer or fall of 1818, had something of a political cast, for in addition to his receiving a commission from the Allied Powers to compose a political treatise on the colonies of South America (probably in relation to the boundaries of French and Portuguese Guiana) he was summoned by the King of Prussia to Aix-la-Chapelle, where the Congress of the Allied Powers was to be held. He arrived there on the 13th of October, and remained till the 26th of November. Famous as Aix-la-Chapelle was, for the treaties that had been signed there, it was never so resplendent as now. The object of the Congress being an important one, namely, the settling of all the old scores that Napoleon had entailed upon Europe, before and after the battle of Waterloo; the adjustment of that formidable bugbear, the Balance of Power; in short the formation of what has since been called the Holy Alliance,—(as if any alliance between kings and emperors could be holy!) it was necessary for all the leading potentates of Europe to be present. Thither came the King of Prussia, and the Emperors of Russia and Austria, each with his train of *diplomats*, astute statesmen, headed by the wily Metternich, and the sagacious Nesselrode. France sent Talleyrand, and England Castlereagh and Wellington. On the 5th of November came William Von Humboldt, somewhat disgusted with politics. Another potentate was present, though we question his being taken into the account by many of the great personages that attended the Congress. It was Alexander Von

Humboldt, who was holding a Congress of his own To this few were admitted save himself, and the King of Prussia. It related to his old scheme of travelling in Asia. The king promised to defray the expenses of his preparations, and to allow him twelve thousand thalers a year during the journey, which he purposed to commence at once. His plans, however, were thwarted, as they usually were in such cases, so he returned to Paris.

The next ten years of his life were prodigal in books.

In 1819 he published the second volume of his "Voyage to the Equinoctial Regions," and "Mimosas and other Leguminous Plants of the New Continent." In 1820 appeared a second paper "On the Mountains of India," and the fourth volume of "The New Genera and Species of Plants." The fifth volume of "The New Genera" was published in the ensuing year; the sixth in 1823. To the latter year belongs his "Geological Essay on the bearing of the Rocks of both Hemispheres." In 1824 he published a work "On the Structure and Operation of Volcanoes," and in 1825 the seventh volume of "The New Genera," the third volume of his "Voyage to the Equinoctial Regions," and "A Numerical Estimate of the Population of the New Continent." In 1826 and '27 he published "The Temperature of the Surface of the Sea in different parts of the Torrid Zone," "The Principal Causes of the difference of the Temperature of the Globe," and "A Political Essay on the Island of Cuba." The draft of this latter work is to be found in the third volume of "The Voyage to the Equinoctial Regions." He has expanded the chapter in which it occurred, and enriched it with a Map, and a Supplement, devoted to the Internal Resources and Com-

merce of the Antilles and Columbia. Three works appeared in 1828 and '29; "Remarks on the Goitre in the Tropics," "On the Systems of Numbers," and "A Revision of the Gramines published in the New Genera and Species of Plants."

A paragraph has sufficed to give the name and date of these works; to criticise them would require at least a chapter. We shall not write that formidable chapter, but, lest the reader should find our *resumé* as meagre as an auctioneer's catalogue, we shall devote a few pages to the subject. As we have already spoken of "The Aspects of Nature," and the "Voyage to the Equinoctial Regions," we shall confine ourselves to some of Humboldt's less popular, but more abstruse books. Discarding an *embarras du richesse*, in the shape of literary and scientific reviews, we shall let Humboldt himself describe them, believing that he understood the character of his writings as well, if not better, than any of his critics. We follow his own classification in the introduction to the "Voyage to the Equinoctial Regions."

"I. *Astronomical observations, trigonometrical operations, and barometrical measurements made during the course of a journey to the equinoctial regions of the New Continent, from* 1799 *to* 1804. This work, to which are added historical researches on the position of several points important to navigators, contains, first, the original observations which I made from the twelfth degree of southern to the forty-first degree of northern latitude; the transit of the sun and stars over the meridian; distances of the moon from the sun and the stars; occultations of the satellites; eclipses of the sun and moon; transits of

Mercury over the disc of the sun; azimuths; circum-meridian altitudes of the moon, to determine the longitude by the differences of declination; researches on the relative intensity of the light of the austral stars; geodesical measures, &c. Secondly, a treatise on the astronomical refractions in the torrid zone, considered as the effect of the decrement of caloric in the strata of the air; thirdly, the barometric measurement of the Cordillera of the Andes, of Mexico, of the province of Venezuela, of the kingdom of Quito, and of New Granada; followed by geological observations, and containing the indication of four hundred and fifty-three heights, calculated according to the method of M. Laplace, and the new co-efficient of M. Raymond; fourthly, a table of near seven hundred geographical positions on the New Continent; two hundred and thirty-five of which have been determined by my own observations, according to the three co-ordinates of longitude, latitude, and height.

"II. *Equinoctial plants collected in Mexico, in the island of Cuba, in the provinces of Caracas, Cumana, and Barcelona, on the Andes of New Grenada, Quito, and Peru, and on the banks of the Rio Negro, the Orinoco, and the River Amazon.* M. Bonpland has in this work given figures of more than forty new genera of plants of the torrid zone, classed according to their natural families. The methodical descriptions of the species are both in French and in Latin, and are accompanied by observations on the medicinal properties of the plants, their use in the arts, and the climate of the countries in which they are found.

"III. *Monography of the Melastoma, Rhexia, and other genera of this order of plants*, comprising upwards of a

hundred and fifty species of melastomaceæ, which we collected during the course of our expeditions, and which form one of the most beautiful ornaments of tropical vegetation. M. Bonpland has added the plants of the same family, which, among many other rich stores of natural history, M. Richard collected in his interesting expedition to the Antilles and French Guiana, and the descriptions of which he has communicated to us.

"IV. *Essay on the geography of plants, accompanied by a physical table of the equinoctial regions, founded on measures taken from the tenth degree of northern to the tenth degree of southern latitude.* I have endeavoured to collect in one point of view the whole of the physical phenomena of that part of the New Continent comprised within the limits of the torrid zone from the level of the Pacific to the highest summit of the Andes; namely, the vegetation, the animals, the geological relations, the cultivation of the soil, the temperature of the air, the limit of perpetual snow, the chemical constitution of the atmosphere, its electrical intensity, its barometrical pressure, the decrement of gravitation, the intensity of the azure colour of the sky, the diminution of light during its passage through the successive strata of the air, the horizontal refractions, and the heat of boiling water at different heights. Fourteen scales, disposed side by side with a profile of the Andes, indicate the modifications to which these phenomena are subject from the influence of the elevation of the soil above the level of the sea. Each group of plants is placed at the height which nature has assigned to it, and we may follow the prodigious variety of their forms from the region of the palms and arborescent ferns to those of the johannesia (chuquiraga, *Juss.*),

the gramineous plants, and lichens. These regions form the natural divisions of the vegetable empire; and as perpetual snow is found in each climate at a determinate height, so, in like manner, the febrifuge species of the quinquina (cinchona) have their fixed limits, which I have marked in the botanical chart belonging to this essay.

"V. *Observations on Zoology and Comparative Anatomy.* I have comprised in this work the history of the condor; experiments on the electrical action of the gymnotus; a treatise on the larynx of the crocodiles, the quadrumani, and birds of the tropics; the description of several new species of reptiles, fishes, birds, monkeys, and other mammalia but little known. M. Cuvier has enriched this work with a very comprehensive treatise on the axolotl of the lake of Mexico, and on the genera of the Protei. That naturalist has also recognised two new species of mastodons and an elephant among the fossil bones of quadrupeds which we brought from North and South America. For the description of the insects collected by M. Bonpland we are indebted to M. Latreille, whose labours have so much contributed to the progress of entomology in our times. The second volume of this work contains figures of the Mexican, Peruvian, and Aturian skulls, which we have deposited in the Museum of Natural History at Paris, and respecting which Blumenbach has published observations in the 'Decas quinta Craniorum diversarum gentium.'

"VI. *Political essay on the kingdom of New Spain, with a physical and geographical Atlas, founded on astronomical observations and trigonometrical and barometrical measurements.* This work, based on numerous official memoirs,

presents, in six divisions, considerations on the extent and natural appearance of Mexico, on the population, on the manners of the inhabitants, their ancient civilization, and the political division of their territory. It embraces also the agriculture, the mineral riches, the manufactures, the commerce, the finances, and the military defence of that vast country. In treating these different subjects I have endeavoured to consider them under a general point of view; I have drawn a parallel not only between New Spain, the other Spanish colonies, and the United States of North America, but also between New Spain and the possessions of the English in Asia; I have compared the agriculture of the countries situated in the torrid zone with that of the temperate climates; and I have examined the quantity of colonial produce necessary to Europe in the present state of civilization. In tracing the geological description of the richest mining districts in Mexico, I have, in short, given a statement of the mineral produce, the population, the imports and exports of the whole of Spanish America. I have examined several questions which, for want of precise data, had not hitherto been treated with the attention they demand, such as the influx and reflux of metals, their progressive accumulation in Europe and Asia, and the quantity of gold and silver which, since the discovery of America down to our own times, the Old World has received from the New. The geographical introduction at the beginning of this work contains the analysis of the materials which have been employed in the construction of the Mexican Atlas.

"VII.—*Views of the Cordilleras, and monuments of the indigenious nations of the New Continent* This work is

intended to represent a few of the grand scenes which nature presents in the lofty chain of the Andes, and at the same time to throw some light on the ancient civilization of the Americans, through the study of their monuments of architecture, their hieroglyphics, their religious rites, and their astrological reveries. I have given in this work a description of the *teocalli*, or Mexican pyramids, and have compared their structure with that of the temple of Belus. I have described the arabesques which cover the ruins of Mitla, the idols in basalt ornamented with the *calantica* of the heads of Isis; and also a considerable number of symbolical paintings, representing the serpent woman (the Mexican Eve,) the deluge of Coxcox, and the first migrations of the natives of the Aztec race. I have endeavoured to prove the striking analogies existing between the calendar of the Toltecs and the catasterisms of their zodiac, and the division of time of the people of Tartary and Thibet, as well as the Mexican traditions on the four regenerations of the globe, the *pralayas* of the Hindoos, and the four ages of Hesiod. In this work I have also included (in addition to the hieroglyphical paintings I brought to Europe,) fragments of all the Aztec manuscripts, collected in Rome, Veletri, Vienna, and Dresden, and one of which reminds us, by its lineary symbols, of the *kouas* of the Chinese. Together with the rude monuments of the aborigines of America, this volume contains picturesque views of the mountainous countries which those people inhabited; for example, the cataract of Tequendama, Chimborazo, the volcano of Jorullo, and Cayambe, the pyramidal summit of which, covered with eternal ice, is situated directly under the equinoctial line

In every zone the configuration of the ground, the physiognomy of the plants, and the aspect of lovely or wild scenery, have great influence on the progress of the arts, and on the style which distinguishes their productions. This influence is so much the more perceptible in proportion as man is farther removed from civilization.

"I could have added to this work researches on the character of languages, which are the most durable monuments of nations. I have collected a number of materials on the languages of America, of which MM. Frederic Schegel and Vater have made use; the former in his Considerations on the Hindoos, the latter in his Continuation of the Mithridates of Adelung, in the Ethnographical Magazine, and in his Inquiries into the Population of the New Continent. These materials are now in the hands of my brother, William Von Humboldt, who, during his travels in Spain, and a long abode at Rome, formed the richest collection of American vocabularies in existence. His extensive knowledge of the ancient and modern languages has enabled him to trace some curious analogies in relation to this subject, so important to the philosophical study of the history of man. A part of his labours will find a place in this narrative.

"Of the different works which I have here enumerated, the second and third were composed by M. Bonpland, from the observations which he made in a botanical journal. This journal contains more than four thousand methodical descriptions of equinoctial plants, a ninth part only of which have been made by me. They appear in a separate publication, under the title of *Nova Genera et Species Plantarum.* In this work will be found, not only the new species we collected, which, after a

careful examination by one of the first botanists of the age, Prof. Wildenow, are computed to amount to fourteen or fifteen hundred, but also the interesting observations made by M. Bonpland on plants hitherto imperfectly described. The plates of this work are all engraved according to the method followed by M. Labillardière, in the *Specimen Plantarum Novæ Hollandiæ*, a work remarkable for profound research and clearness of arrangement."

The publication of these immense works is an epoch in the history of bibliography. To give some idea of the amount of money that was expended upon them we will give a list of the prices at which they were published. Many of them, we should premise, particularly the folios, were brought out as separate pamphlets, or in numbers, on different kinds of paper, and at different prices. We shall enumerate the latter only, as we write for general rather than bibliographical readers.

Voyage to the Equinoctial Regions. There are two editions of this work, one in quarto, in three volumes, another in octavo, in thirteen volumes. The former was published at one hundred and fifty-eight francs, (large paper copies two hundred and fifty-two francs,) the latter at ninety francs. The six Atlases which accompany the work cost two hundred and sixteen francs.

The Picturesque Atlas. Published in folio, at five hundred and four francs, (large paper copies, five hundred and seventy-six francs,) and in octavo, at twenty-five francs.

Political Essay on the Kingdom of New Spain. There are three editions of this work; one in quarto in two volumes, with a folio Atlas, published at two hundred

and fifty francs, and two in octavo, in four and five volumes, published at thirty-six francs.

Observations on Zoology. Two quarto volumes. Published at three hundred and fifty francs, (large paper copies, four hundred and twenty francs.)

Astronomical Observations. Two quarto volumes. Published at one hundred and ninety-two francs, (large paper copies, three hundred and fifty-two francs.)

Equinoctial Plants. Two volumes, folio. Published at five hundred and ten francs, (large paper copies, eight hundred and fifty francs.)

Monography of Melastomes. Two volumes, folio. Published at eight hundred and sixty-four francs, (large paper copies, one thousand four hundred and forty francs.)

Mimosas and other Leguminous Plants, folio. Published at six hundred and seventy-two francs, (large paper copies, eight hundred and forty francs.)

Revision of Gramines in the New Genera. Two volumes, folio. Published at one thousand nine hundred and twenty francs.

The New Genera and Species of Plants. There are two editions of this great work, one in quarto, in thirty-six books or parts, and one in folio, in seven volumes. The former was published at one thousand two hundred and ninety-six francs, the latter at one thousand eight hundred francs. (Large paper copies, three thousand six hundred francs, six thousand four hundred and eighty francs, and seven thousand two hundred francs.)

The cheapest copies of these works cost at publication, unless our arithmetic is at fault, five thousand nine hundred and fifty-five francs, the dearest fourteen thousand

one hundred francs. Or, calling five francs a dollar, one thousand one hundred and ninety-one, and two thousand eight hundred and twenty dollars!

If it took a small fortune to buy these books, it took a large one to make them. The exact amount is not known, but it is estimated at two hundred thousand dollars. The French and Prussian Governments assisted in their publication, but the greater part of the cost was borne by Humboldt himself, and of course was lost. For however successful such works are, scientifically, they are always failures in a mercantile point of view. The labour and expense involved in the writing and publishing of these works gives us a grander idea of Humboldt, than we could obtain from any relation of his travels. They show his intense and unselfish devotion to science, a devotion of which few men besides himself were capable, and to which no man ever sacrificed more—and place him among the literary benefactors of the world.

But to return to our narrative, from which these bibliographical remarks have led us. Humboldt remained at Paris until 1822, when he proceeded to Verona, where another Congress was being held. There he met the King of Prussia, and after the Congress was over, accompanied him on a journey through Italy, stopping on the way at Venice, Rome, and Naples. While at Naples, Humboldt had several opportunities of visiting Vesuvius, which was in a very active state. A series of eruptions succeeded each other, from the commencement of the year to the time of his visit to Naples, which was in October or November. He made three ascents of Vesuvius, partly to witness the eruption, and repeat his former barometric measurements of the mountain, and

partly to make a more complete determination of all the edges of the crater.

The eruption of Vesuvius which Humboldt witnessed in the autumn of 1822 was the most memorable of any of which we possess any authentic account, since that which occasioned the death of the elder Pliny, and destroyed Herculaneum and Pompeii.

In the commencement of 1823, the King of Prussia returned to Berlin and Humboldt accompanied him thither. It was not long before he was at Tegel. He found his brother William, and Frau Caroline, and the children there, but not the old castle of his childhood. Only one turret of it remained; the rest had given place to a new and stately building. The grounds, the trees, the flowers, all were changed; but so was Humboldt himself. The careless light-hearted boy had passed away, and in his stead was a staid and thoughtful man. He left Tegel when he was fourteen, he returned when he was fifty-four! What changes had passed over him in that time! What lands he had seen, what books he had written! He left Tegel a boy, clever it is true, but unknown: he returned a famous man, known to the world, one of the world's men—a Name!

Humboldt remained some months at Tegel and Berlin, enjoying the society of his brother, and his king. The king had long honoured him for his profound knowledge of science, and felt a strong liking for his person and conversation. This liking and honour now took a definite turn; he solicited Humboldt to remove from Paris, and to come and live in Berlin. His brother, William, and Frau Caroline, joined in this solicitation, and he resolved at last to gratify them. He would

return to Paris for a while, and finish some of the works that he had left there undone; then he would come to Berlin. So back to Paris, his dear Paris, he went.

He remained at Paris till the autumn of 1826, when he made a visit to his brother at Tegel, to announce his speedy and permanent return to Berlin. While stopping in Berlin, or on his way back to Paris, he saw Goethe. Of Goethe's impressions of Humboldt at this time we have a record in "Eckerman's Conversations," under the date of Monday, 11th December. Hear the German Boswell.

"I found Goethe in an animated and happy mood. 'Alexander Von Humboldt has passed some hours with me, this morning,' said he, coming to meet me with great vivacity; 'What a man he is! Long as I have known him, he is continually astonishing me anew. I may say he has not his equal in knowledge, in living wisdom; and such many-sidedness I have found nowhere else. Wherever you call upon him, you find him at home, everywhere ready to lavish upon you the intellectual treasures he has amassed. He is like a fountain with many pipes; you need only to get a vessel to hold under it, on any side refreshing streams flow at a mere touch. He is to stay some days, and I shall feel, when he goes away, as if I had lived years during his visit.'"

This is the way that a great man speaks of his equal. How unlike those little fellows, the reviewers! Clearly Goethe would never have answered the requirements of the Quarterly.

In February 1827, Humboldt removed from Paris. He did not proceed directly to Berlin, but joined his brother's

son-in-law, Count Bülow, who had just been appointed ambassador to England, on a journey to London. Humboldt's stay in England was short, for in May we find him permanently settled in Berlin. He found his brother in Berlin, for he had a residence there, as well as at Tegel, and scores of his old friends, among others Augustus Schlegel. The king received him with open arms, and conferred upon him the title of privy councillor. He might have been Secretary of State, if he had chosen; indeed, there was no office too good for him, but he loved Science too well to change it for Politics. Never enamoured of that artful, but powerful goddess, who, whatever her faults, is sure in the end to reward her worshippers, he was less likely to be won by her blandishments then, than at any other period of his life. He had a new and grand scheme on foot,—one that he had pondered over for years. He thought of it at Paris, in his study among his books and manuscripts, and in the *salons* of art and fashion, among the wise and the foolish. He thought of it in Mexico, as he groped his way in the darkness of the mines, or wandered among the ruins of vanished nations. He thought of it in Peru, on the rugged sides of Chimborazo and Cotopaxi; in the terrible pass of Quindiu; in the dense forests of the Orinoco, and at Cumana among the earthquakes. He thought of it on the deck of the Pizarro, in the midst of the Sea, and on the crater of Teneriffe in the illimitable wilderness of Air. He thought of it everywhere, by day and at night, in his waking moments, and in his dreams. It was always with him. It was the one thought of his thoughts, his first and last conception, the most majestic statue of his house of life. It was "Kosmos." "Its undefined

image," he wrote in 1844, "has floated before my mind for almost half a century."

All the travels that he had undertaken, and all the books that he had written, related to this great work. It was not as a traveller that he had crossed the sea, and explored unknown lands: nor yet as a man of science: but as *the* traveller, *the* man of science. He aimed at no common fame. Indeed, he aimed at none. It was to a nobler object than "the bauble reputation" that he devoted his life; it was a thirst for knowledge, a passion for wisdom, not in one thing, or many things, but in all things. To be a wise man was not enough; he would be the wisest of men. His wisdom was universal, like the Universe to which it was directed, and which he understood, if ever man did, or can understand it.

On the 3rd of November, 1827, he commenced a series of lectures on the Universe, at Berlin. The University building in which they were delivered was crowded. The king and royal family were there; the court was there: the rich, the noble, the wise—in short all the intellect of Berlin was there. A perfect master of his theme, he was clear, eloquent, impassioned, inexhaustible, and they were enchanted. He stood before them like one inspired. It was a memorable time in Berlin, and indeed throughout Prussia; for the fame of these lectures was soon noised all over the land. Scholars came from great distances to hear him, and even common people, the unlettered mass, who only knew of him through the newspapers. Everybody was anxious to hear and see Humboldt.

The press was soon so great that he was forced to repeat the earlier lectures, in a larger building. "Alex-

ander," William wrote to a friend in Vienna, "Alexander is really a 'puissance,' and has gained a new kind of glory by his lectures. They are unsurpassable. He is always the same; and it is still one of the principal features of his character to have a peculiar timidity and undeniable anxiety in the mode of his appearance." But Herr William that is not strange, for your truly great man is always modest. The greatest of men—the "myriad-minded" Shakespeare was so, or he would never have left his divine plays to the mercy of the players and commentators.

"These lectures of Humboldt," says his biographer, Professor Klencke, "were also new and remarkable in respect to the position which he took towards the people. For while other learned men, whose social position is always higher than that of the people, nearly all, in their scientific and academic pride, did not deem it worth their while to disseminate their knowledge among the people, whom it must ultimately most benefit, while they generally keep their learning as the property and mystery of a caste, and interchange it among themselves; while they consider it *infra dig.* and degrading for a man of science to popularize his knowledge; Alexander Von Humboldt set them the noble example that a baron, a chamberlain, and confidential adviser of his king, did not consider it beneath his rank and dignity to appear publicly as the teacher of his favourite science; he showed that a true man of science does not attach himself to an exclusive caste, and that all considerations of birth, rank, and title, are as nothing in the high service of science. And thus, Alexander, in the impulses of his heart and mind fulfilled the noble duty which the men-

tally-gifted man owes to his people of bestowing on them, and instructing them with the rich treasury of his knowledge and experience, thereby raising them nearer himself."

Humboldt finished his course of sixty-one lectures on the 26th of April, 1828. Their reputation was now so universal that he was urged to print them, for the sake of those who had not been able to hear him. He consented to do so, and began to write them off from memory, for he had spoken without notes, but his attention was distracted by other things. He had been applied to some months before, while the course was in progress, by Count Cancrin, the Russian Minister of Finance, who requested him to give his opinion as to the eligibility of a coinage of platina from the Ural, and its relative value to gold and silver. The Spanish Government had also applied to him on the same subject, and a proposal had been made by some private individuals to the Congress of Vienna, to introduce the new metal into circulation, supported and recognised by government authority. Humboldt doubted the eligibility of the scheme, and said so frankly, without forfeiting the good opinion of the Russian Government. Happening in the course of his correspondence to express a wish to visit the Ural, and to compare its mountains with those of the New World, the Emperor of Russia invited him to undertake an expedition thither, and offered to defray the whole expense. More than this, he was instructed to consider the advantages which the Imperial Government might draw from his researches into the mining capabilities of the country, as of secondary importance, and to devote himself entirely to what he thought the advancement of

science. The offer was too tempting to be resisted. He had long dreamed of such a journey, but his plans for it had been repeatedly thwarted and postponed. It had seemed to him that it was never to be, but here when he least expected it, when he had almost ceased to think of it, was an opportunity such as might never occur again. He at once accepted the offer.

Besides the preparations which such a journey demanded, he was busy with other important matters—the books that he had in progress, some of which were then passing through the press, and above all with the unhappy case of his friend Bonpland. We left poor Bonpland as far back as 1817, in Brazil, on his way into the interior of that country. He ascended the Parana until he reached the ancient mission of the Jesuits, which was situated on the left bank of that river, at a little distance from Itapua. The possession of this region of country was then a subject of dispute between Paraguay and the Argentine Confederation. Aware of this fact, Bonpland notified Dr. Francia, the Dictator of Paraguay, of his presence there, and explained to him his intention of cultivating tea, with the aid of a small colony of Indians whom he had taken into his service. Francia wished to have the monopoly of tea to himself, so he pretended to take Bonpland for a spy, and sent four hundred men across the Parana one dark night to fall upon him and his Indians. The little colony was taken by surprise; a massacre ensued, many of the Indians were killed, most were wounded, and Bonpland himself received a sabre-cut on the head. He repaid this inhuman assault by dressing the wounds of the soldiers. Two days afterwards (the massacre took place on the night of the 3d

of December, 1821) he was sent in chains to the neighbouring village of Santa Maria. Francia refused to see him; he was not imprisoned, but a watch was kept upon him, and he was forbidden to return to Assumption. He was allowed to practise as a physician, so he whiled away the months and years of his captivity, in making medicines, distilling and composing liquors, and in going about to minister to the sick and afflicted. He wore only the coarsest garments, and went barefooted.

It was a long time before intelligence of this outrage reached Europe, but it did at last, while Humboldt was residing in Paris, and he left no means untried to secure the release of his friend and fellow-traveller. He interested the French Government in his behalf, and Chateaubriand, who was then Minister of the Affairs of Strangers, demanded his freedom from the tyrannical Francia. It was not granted. The Emperor of Brazil made the same demand with the like success. At last, however, after a captivity of nearly eight years, Bonpland was set at liberty. What influence was powerful enough to compel Francia to this tardy act of justice is not known, but it is said to have been that of Bolivar. If so, he probably owed his freedom to Humboldt. We know that Humboldt was at this time in correspondence with Bolivar, in reference to the internal improvement of his country, and we cannot doubt that he urged the cause of his friend with him, as he had previously done with the French and Brazilian Governments. It was Humboldt, we believe, who restored Bonpland to liberty.

Ostensibly set free on the 12th of May, 1829, he took the road to the Missions, but when he arrived at Itapua there was no order there for his release. He remained at

Itapua some months before the capricious Dictator could make up his mind to let him go. On the 6th of December, 1830, the creatures of Francia again beset him, and demanded of him, for the fourth time, the motives of his former association with the Indians. They insisted upon knowing whether he was a spy of the French or Argentine Governments. Finally on the 2nd of February, 1831, they told him that he was free to cross the Parana, and that the Supreme, (not his Maker, but one of his Maker's worst specimens of humanity, Francia), allowed him to go where he would. He hurried towards Brazil, and fixed his residence on the frontier near the little city of San-Borja. There, in a modest cottage, surrounded by a large garden of orange trees, he passed the remainder of his life, practising medicine, botanizing, and writing to Humboldt and the *savans* of Europe. He died last year over eighty years old.

When Humboldt accepted the offer of the Russian Government, to explore the mountains of the Ural, he selected two companions for the journey,—Christian Gottfried Ehrenberg, and Gustav Rose. Both these naturalists were young men, one being thirty years old, and the other thirty-three, which was about the age of Bonpland and Humboldt when they started on their great transatlantic journey twenty-nine years before. Rose, who had studied chemistry and mineralogy, was conservator of the collection of minerals in the University of Berlin; and Ehrenberg, whose *specialité* was the microscope, had travelled with Hemperich through Egypt, Abyssinia, and a great part of Arabia, and had brought back from those countries a magnificent collection of plants and animals, many of which were till

then unknown in Europe. The narrative of his travels, which lasted from 1820 to 1825, was published while the preparations for the Asiatic journey were in progress, and was edited by Humboldt. Besides editing, or helping to edit, this work, and attending to the measurements of temperature, which the king, at his suggestion, had caused to be made in all the Prussian mines, the never-resting traveller was occupied and troubled with the afflictions of his brother. William was indeed afflicted, for Frau Caroline, who had been in ill health for years, was slowly dying. At the close of Alexander's lectures he had taken her to Paris and London, in the hope that a journey thither, and the use of the bath of Gastein, at which they were to stop on their return, would benefit her; but it was not to be. They returned to Tegel in the middle of September, and she was worse than ever. She failed rapidly, and towards the end of November was in constant expectation of death. November, December passed, and she still lived. All over the land the Christmas holidays were celebrated. The candles were lighted on the Christmas tree, the presents were plucked from the branches, and rich and poor, young and old rejoiced in the birth of the blessed Christ-Child. But at Tegel all was sad. No Christmas tree, no gifts, no happy hearts. All was stillness and gloom,—the hush of the sick chamber, the shadow of the coming doom. The New Year came, and went, and Frau Caroline still lived. Alexander visited her on a Lord's day in January. "She was dying," he wrote to a friend; "opened her eyes and said to her husband, 'Another human being is ended!' She expected her death, but in vain; she lived again and took an interest in what was

going on around her. She prayed much." So wrote Alexander on the 22nd of January, 1829. He was still preparing for his journey: Frau Caroline was prepared for hers. It was a short one.

"One step to the white death-bed,
And one to the bier;
And one to the charnel,
And one—oh where?
The dark arrow fled
Into the noon!"

She departed on the 26th of March. There was another grave at Tegel.

CHAPTER II.

CENTRAL ASIA.

On the 12th of April, 1829, Humboldt, Rose, and Ehrenberg departed from Berlin for St. Petersburg. They had arranged the different branches of science to which each was to devote himself. Ehrenberg was to attend to the botany and zoology of the countries through which they should pass, Rose was to analyse the minerals, and keep the travelling diary, while Humboldt undertook the magnetic observations, the results of geographical astronomy, and the geology and natural history generally. To show the respect in which he held him, before he started, the King of Prussia appointed Humboldt an acting privy councillor. It was the rank of a minister, and his title thenceforth was Excellency—"His Excellency the Baron Von Humboldt."

On their way from Berlin to St. Petersburg, the travellers passed through Königsberg and Dorpat, Esthonia and Livonia. As the sea shore in the neighbourhood of Königsberg abounded with amber, it was almost a forbidden ground to the inhabitants. It was farmed out at a high rate, and carefully guarded, so that the fishermen could only put to sea at certain prescribed points of the coast. The coast between Dantzic and Memel was let

out to a rich contractor for ten thousand dollars a-year. His magazines contained, at the time the travellers visited them, one hundred and fifty thousand pounds of amber. Being highly inflammable it was kept in vaulted rooms, which were secured with iron doors.

They arrived at St. Petersburg on the 1st of May, and found everything in readiness for their journey. Carriages, couriers, and horses were placed at their disposal by Count Cancrin; a military escort was provided for them, and even their residences on the way were selected. A Russian mining officer was appointed as Humboldt's companion, to give him information regarding the roads and localities, and to see that the authorities performed what was required of them.

The travellers remained some time in St. Petersburg, in order to see its sights before they commenced their journey. They visited the public institutions of the capital, and most of the show-places in the vicinity. As might have been expected, from their tastes, and the objects of their journey, they were attracted by the mineralogical collections of St. Petersburgh, and the size and splendour of the crown jewels. The largest of these jewels was on the top of the imperial sceptre. It weighed one hundred ninety-four and three-quarter carats, and its greatest diameter was one inch three and and a half lines. Formerly in the possession of Nadir Shah, whose throne it long adorned, it was bought, with other jewels, after his death, by an Armenian at at Bagdad, for fifty thousand piastres. From this Armenian it was purchased by Catharine the Second, at the price of four hundred and fifty thousand silver rubles, and a patent of nobility.

On the 20th of May the party started for Moscow. Besides a courier, and the mining officer already mentioned, they were furnished with a Russian cook, as in the stations beyond Moscow travellers were obliged to cook for themselves. The broad highway between St. Petersburg and Moscow was soon traversed, and they halted for a few days in the old capital of Moscovy. After making some barometric observations and examining the geology of the country, they continued their journey over a marshy level until they reached Nishni Novgorod, on the Volga. Here they met with Count Polier, the owner of several large mining estates in the Ural, and as he was on his way thither he joined the party. They embarked on the Volga on the last of May, and reached Kasan on the 4th of June.

Originally the seat of a Tartar Khanate which was overturned in 1552, after flourishing for three hundred years, Kasan was still inhabited by Tartars, especially in the suburbs. The travellers visited the temples of these Tartars to see their form of worship: the guides removed their slippers as they entered, but as the travellers wore boots they were permitted to keep them on.

The party remained at Kasan five days, during which they made several excursions in the neighbourhood. The most interesting of these was to the ruins of Bulgar, the capital of ancient Bulgaria. As they drew near the modern village they were met by groups of men, women, and children; the whole population came forth to meet them. At the head of these groups walked the oldest inhabitants, who, when they came to Humboldt, offered him bread and salt as a token of reverence, according to the Russian custom.

Dismissing these good people when their hospitable ceremony was over, the travellers proceeded to the ruins of the old capital. They found the walls of some buildings still standing, two towers, and a number of tombstones bearing monumental inscriptions, in Turkish, Arabic, and Armenian. These inscriptions dated back to the year 623 of the Hegira (A. D. 1226). Silver and copper coins and copper rings and trinkets were sometimes found in the rubbish of Bulgar. There were several tombs among the ruins, which were objects of veneration to the faithful. They were the tombs of Tartar saints, who, as the Tartars generally were anything but saints, were undoubtedly, in their time, the cream of Tartars. The travellers found a Mollah performing his devotions at one of these tombs. He repeated his form of prayer, and bowed his body without being disturbed by their presence. They offered him a seat in their carriage, which he accepted, as the ruins were some distance from each other; and he managed each time they stopped, to finish his devotions before they finished their examinations. Devotion was a good thing, so was a comfortable ride. Returning to Kasan they witnessed the Saban, a Tartar festival, celebrated every year after seed-time. The Tartars wrestled with each other, and ran foot races, and galloped their horses at full speed. It was a scene of barbaric merriment.

They left Kasan on the 9th, and passed through a district inhabited by the Wotjaks. This tribe was a branch of the family of Finns; they had embraced Christianity, and spoke the Russian language, although they retained the customs of their ancestors. The women wore high caps of birch-bark, covered with blue cloth, bedecked

with fringes, and hung with silver coins. On the 12th they reached the estate of Count Polier, at Werchne Mulinsk, where they halted to partake of his hospitality.

From Werchne Mulinsk, they journeyed to Jekatharinenburg, the Count accompanying them. Near Perm they fell in with a party of exiles on the way to Siberia. This party consisted of sixty or eighty women and girls, and as they were not fettered, they were probably ban ished for trivial offences. The worst class of criminals were always fettered while on their way to Siberia, being fastened by one hand to a long rope. The party that the travellers overtook was escorted by a band of armed and mounted Bashkirs.

The postmaster at Malmüsch was a mineralogist, with a taste for anatomy, for around and within his house were the teeth and bones of an immense mammoth, found on the banks of the Wjatka.

On the 14th the travellers reached the outskirts of the Ural—a series of delicious vallies. When they left the Neva three weeks before, it was crusted with ice; now the grass was out, the plants were in full bloom, and the ground was profusely covered with flowers. On the 15th they arrived at Jekatharinenburg.

Jekatharinenburg was situated among the mountains on the Asiatic side of the Ural ridge. This ridge consisted of several nearly parallel lines, whose highest point rose to the height of nearly five thousand feet. Its direction in the meridian, which was in a line standing perpendicularly upon the equator from the pole, reminded Humboldt of a similar situation in a chain of the Andes. The northern and central portions of the Ural mountains contained gold and platina, and abounded in minerals of all kinds.

The party remained at Jekatharinenburg four weeks, making excursions to the mines in its vicinity. They visited the gold mines of Schabrowski and Beresowsk, and the copper mines of Gumeschewskoi, and penetrated as far northward as Nischne Tagilsk. Nischne Tagilsk and the whole district for some eight thousand square versts belonged to the Demidoff family. Their ancestor, Netika Demidoff, was a common blacksmith at Tula, poor and obscure, until Peter the Great, in 1702, made him a present of Magnetberg, a recently discovered magnetic mountain, and the iron forges of Newjansk. This was the foundation of Nischne Tagilsk, and the fortunes of the family.

Nischne Tagilsk was one of the richest mining districts in the world. At two versts distance from it stood the Magnetberg, which supplied all the surrounding forges with ore, and in the immediate neighbourhood were copper ores, and mines of gold and platina.

Between Tscherno-Istotschinsk and Kuschwinsk, a lofty plateau separated the waters of Europe and Asia. On the east rose the springs of Bobrowka, a rivulet flowing into the Tagel; on the west those of the Wissim, which flowed into the Utka and Tschussowaja. Near the centre of this plateau stood a majestic pine, with the words "Asia," and "Europe" carved on the right and left sides. It was the guide post of two continents.

Not far from Kuschwinsk, which was the seat of the Imperial Iron Works, there was a second mountain of magnetic iron. It was called Gora Blagodat, or the Blessed Mountain. Its existence was made known to the Russians by a Wogul, named Tschumpkin, who was afterwards burned alive on it by his enraged countrymen.

the primitive inhabitants of the country. The Russians erected on the summit a monument to his memory.

This region abounding in gold and platina, reminded Humboldt of the gold and platina regions of Brazil. The latter produced diamonds; why should not these produce hem also? They would, if there was any truth in his theory, that Nature was always true to herself; not governed by accident or caprice, but by eternal immutable laws, of which she was at once subject and sovereign. He had already in his "Essay on the Bearing of Rocks," directed attention to the singular analogy of mineralogical characteristics in different parts of the globe, as regards platina and gold-sand. Thus at Corrego, in Brazil, gold, platina, and palladium were found together; near Tejuco gold and diamonds; and platina and diamonds near the river Abaste. This fact awakened in him the strongest hope of discovering diamonds in the Ural. When he arrived at any of the works he caused the gold-sand to be subjected to microscopic observations: if gold and platina were found in it, he directed the workmen to search carefully for diamonds. These examinations revealed the existence of crystals previously unknown in the gold-sands of the Ural, such crystals as in Brazil occurred in gold-sand with diamonds.

The travellers parted from Count Polier at Kuschwinsk, on the 1st of July. It was their intention to have accompanied him to his estates on the Koiva, in the western declivity of the Ural, but as the direct path was only practicable on horseback, and another route would have caused them to lose too much time, they abandoned the idea. The same day they proceeded to

the copper mines of Bogoslowsk. The road led through dense forests of pines, larches, and cedars; here and there were birches and poplars. The underwood of these forests was formed of wild roses in full bloom, and luxuriant junipers whose dark green shade was relieved with the light hue of the birches. The richness and beauty of the plants contrasted strongly with the poverty of the *fauna*. The travellers saw hares and squirrels, and "such small deer," and now and then a bird No warbling was heard in these forests. They saw several small hawks, and one finch, but no civilized birds, so to speak, such as swallows, wagtails, etc. The excessive vegetation of plants abounding in sap, produced myriads of gnats, which were a great torment to the travellers. To protect themselves against these gnats the inhabitants of the country wore over their faces nets steeped in birch tar, the smell of which was offensive to the insects. Sometimes they carried pots on their backs, filled with decayed wood; or they burned the fungus of the birch, the smoke of which was not injurious to the eyes. As the travellers were not prepared to meet the gnats, they suffered severely from their attacks: their only resource was to drive rapidly through them. When they drove slowly, or stopped, they were beset and stung by swarms. Their horses were stung worse than themselves: the poor beasts were in agonies. Along the road, which was being mended at the time, were groups of peasants at work. These peasants had lighted fires as a means of defence against the gnats, and whenever they paused from their labour they held their heads in the smoke, preferring to suffer that rather than the intolerable torment of the insects.

Arriving at last at Bogoslowsk, the travellers proceeded to visit the mines in its vicinity. The scenery here was magnificent. To the east was a broad unbroken plain, stretching away like the sea: to the west and north, forty or fifty miles distant, a range of magnetic mountains. The peaks of these mountains, clad with snow, loomed over the dark forests of pine and fir that covered the intervening heights.

From Bogoslowsk they returned to Jekatharinenburg, stopping on their way at Mursinsk. This district was rich in precious stones, topazes, beryls, amethysts, and the like. Eighty-five versts from Jekatharinenburg, near the granite rocks on the right bank of the Tekowaja, emeralds were found in abundance. The presence of emeralds in this neighbourhood was first detected by a peasant, who was attracted one day as he was cutting wood by their lustrous sparkling in the mica, where the ground was opened around the roots of a tree which had been blown down by the wind. He collected a quantity, and took them on sale to Jekatharinenburg. They were tested, fresh excavations were made, and specimens were sent to St. Petersburg. These emeralds were remarkable for their extraordinary size, one in the mineralogical collections of St. Petersburg being no less than eight inches in length, and five inches in diameter.

The travellers arrived at Jekatharinenburg on the 11th, after an absence of sixteen days. They spent a week there preparing and arranging their collections, and then set out for Tobolsk, where they arrived on the 21st.

Tobolsk had been originally laid down as the eastern limit of their journey, but their speedy and easy progress through the northern Ural induced Humboldt to

extend his researches to the Altai, of which but little was known since the time of Pallas, Renovantz, and Hermann. This scheme was strongly supported by the Governor-General. The distance from Tobolsk to Barnaul was one thousand five hundred versts, but by starting at once they could traverse it within the time prescribed for their undertaking. So providing themselves with cap-nets as a defence against the gnats, they immediately commenced the journey. Their road lay across a steppe through Zara and Kainsk to Tomsk. The soil was firm and black, cultivated near the villages, and everywhere covered with tall herbage, interspersed with groups of birch and poplar. Between the Wagai and the Ischen whole tracts were covered with red flowers in full blossom: others were of a deep azure. The peasants of the villages through which the travellers passed appeared to be wealthy, and their houses, for the most part, were strikingly clean and neat.

As the sky was unclouded the heat was considerable. The waters of the river Ajeff, at noon, on the 21st, were 19° 4′ Reaumur, the air being 24° 6′. The Irstysch was also warm, being 19° near the convent of Abalak, on the 24th. The water of the wells, however, was extremely cold. At Basckshewa, the first station from Tobolsk, the water of an ordinary well, free from ice, was 2°.

Ascending the Irstysch to Tatmytakaja they proceeded in a south-easterly direction to the waters of the Om, and thence eastwardly along its banks across the great steppe of Barabinski, which reached from the Irstysch to the Obi. Unlike the majority of steppes which are dry and arid, this terrible waste abounded with marshes, rivers

and lakes. The soil in some places was flat and level as the sea, in others it was covered with vegetation It was impregnated with salt, and many of the lakes contained salt water. The road was bridged in long courses over the marshy ground; but as these courses were out of repair, the travelling was tedious.

The party reached Kainsk on the 29th. Here they learned, for the first time, that the Siberian Plague was raging in the neighbouring villages. The physician who gave them this intelligence could afford them but little information regarding the nature of the disease, except that it broke out among the cattle, and soon extended to men. It attacked men in the uncovered parts of the body, in the face, neck, or arms, commencing with an indurated swelling, which turned to black and burning suppurations, that ended in fever and death. The origin of the disease was ascribed to the stings of insects.

As it was impossible to reach the Altai region by any other route, at least within the time they had allowed themselves, the travellers resolved to continue their journey, taking all possible precautions to avoid contact with the peasants among whom the plague prevailed. They even refrained from sleeping at the halting places. They found traces of the malady in all the villages. The day before their arrival six persons died at Karganskaja, where five hundred horses had already perished. It was with considerable difficulty that they procured the means of continuing their route. Every village had a hospital of its own, and smoky fires of dry turf and dung were kept continually burning, in order to purify the air. As the travellers drew near the Obi and left the steppe

behind them, the disease disappeared. It was never known among the mountains.

They crossed the Obi at Bergsk, and proceeding in a southerly direction, reached Barnaul on the morning of the 2d of August. In nine days they had travelled one thousand miles.

The city of Barnaul was the central point of the mining interests of the Altai. It was the seat of the authorities of the whole region, and the principal location of its smelting furnaces. The most important product of the Altai was silver, the yield of which was greater there than in any other part of the continent. For fifty years before Humboldt's visit it amounted to two hundred thousand dollars annually. The annual yield of the mines during the same time was five hundred thousand pounds of copper, and eight hundred thousand pounds of lead. Notwithstanding the quantity of silver produced by the Altai, the ore from which it was obtained was very poor; its average was only four per cent., while the average of the silver ores of Mexico was from eighteen to twenty-five per cent.

Though the working of the Altai mines was more recent than that of the Ural, the former were undoubtedly known from the earliest antiquity, for the remains of ancient mining operations were plentiful among them. These remains were generally ascribed to the Tchudes; but who the Tchudes were, and at what period they lived was a mystery which no one cared to inquire into. It was enough to know that they had left the mines behind them. The actual working of the mines of the Altai owed its existence to Akimfitsch Nitikas Demi

doff, a son of the old blacksmith of Tula. With the permission and assistance of the government he formed, in 1728, the great smelting establishments of Kolywansk and Bjelaja, and in 1739 laid the foundation of the town of Barnaul.

Leaving Barnaul on the 4th, the travellers journeyed southward across the steppe of Platowskaja to the upper districts of the Obi. They visited the porphyry works of Kolyvansk, and the silver mines of Riddersk and the Serpent Mountain. This mountain, which derived its name from the great number of serpents found upon it when it was discovered, was an immense mass of ores, the most important of which was silver. Two versts beyond Riddersk there was a comical hill, called Kruglaja Sopka, or the Round Mountain. The vegetation of this hill, which was destitute of trees, was so dense and lofty that it prevented the travellers from seeing each other, when they were a few steps apart.

On the 13th they reached Ustkamenogorsk, a fortress on the frontiers of Chinese Mongolia. Leaving their baggage at this post, which was guarded by a company of Cossacks, who went through their military exercises for them, they continued their journey to the gold and silver mines of Syranowsk. Beyond Syranowsk they came in sight of the ranges of Cholsun and Katunja. They saw at a distance of thirty miles the Stolbrowucha, and still further to the eastward the untrodden summit of Bjelucha, or as it was called by the Calmucks, God's Mountain, the highest peak of the Altai. In this region, near the source of the Berel, in the valley of Rachmanowka, the travellers saw some remarkable hot springs. A few feet distant from one of these springs was one of

cold water, which flowed eastward through the turf, into a small lake.

They were now so near the boundary of China that Humboldt determined to pass over to Batê, the nearest Chinese Mongolian post. It was situated on the Irstysch, below Lake Saisan. As he had made known his wishes at Buchtarminsk, a Cossack had been sent to Batê to announce his visit. There were two stations at this post, one on each bank of the river. The left, or Mongolian station, was occupied by Mongolian troops, the right, or Chinese station, by Chinese troops; both were commanded by Chinese officers. Between these two stations, on an island in the Irstysch, was a Mongolian and Chinese piquet, commanded by a captain of cavalry. Unlike the rest of the soldiers, who lived in tents, this piquet lived in houses. They superintended the fishery carried on by the Mongols of the Chinese portion of the Irstysch, and arranged the moderate duties on salt, payable to the Chinese officers. During the winter, when there was no fishing, the Mongolian part of the piquet returned to the village of Krasnojarsk, while the Chinese retired to the town of Tschugutschask, south of Lake Saisan, and four hundred and fifty versts from Buchtarminsk.

The travellers visited the Chinese station first, and as their arrival was expected, they found two tents prepared for their reception. They were met at one of these tents by the Chinese commander and two attendants. He was a tall, thin, young man, arrayed after the fashion of the Celestial Empire; he wore a blue silk robe reaching to his ancles, and the usual conical cap, adorned with peacock feathers, which denoted his rank. His companions wore a similar dress, but had no feathers in their

caps. He invited the travellers by signs to enter the tent. It was carpeted, and opposite the door stood several chests, covered with carpets and pillows. He seated himself on one of these extempore couches, and placed Humboldt by his side; the rest of the party sat on the other chests, or on the ground. The interpreter they had brought spoke only Mongolian, but as the Chinese commander understood that language they were able to converse with him. He offered them tea, which was declined, and then inquired into the object of their journey. Humboldt told him it was to inspect the mines, and questioned him in turn. He told the traveller that he came direct from Pekin, on horseback, in four months; that he had not been long on that station; and that he would be sent to another in three years, that being the length of military service at any one station in China.

Proceeding to the Mongolian post, they found the commander in his tent at the end of an avenue of poles, upon which hung fresh pieces of meat. He was dressed like his comrade on the other side, but was considerably older, and very dirty, as were also his tent and attendants. As he did not understand Mongolian, or pretended not to, the conversation was carried on with difficulty. Humboldt presented him with a piece of velvet, which he accepted thankfully and offered tea, which was declined. He led the party to a temple on the bank of the Irstysch. It was a small square wooden building, with a door opening on the river. In the interior was an altar, and on the wall over the altar, a Buddist idol. Between the door and the river in a kind of walled court, there was another altar with burning coals on it.

Returning to their own tent, the party were visited by

the first commander, who was accompanied by his two companions and a band of soldiers. They received him seated, while the common Mongolians crowded around the door and looked on. The ceremonies of visitation over, he and his attendants lighted their pipes, and smoked vigorously, urging the travellers to do the same. He tried some tobacco which they offered him, and relished it highly, but seeing that they did not join him in his fumigation, he put up his pipe, as his good breeding would not permit him to smoke alone. Humboldt offered him a piece of blue cloth, which he declined to accept, though evidently with great reluctance. It was pushed towards him, and pushed back, but very gently, several times. When he had done all that Chinese politeness required of him under the circumstances, he accepted it, and the twinkle of his eye showed the satisfaction that he felt. He inquired what he could offer in exchange, and the interpreter, who had received his instructions before hand, told him that he could offer Humboldt nothing that he would value so much as some Chinese books, which he had seen in his tent. They were immediately brought, and the same ceremony was again gone through with: he pushed them towards Humboldt, and Humboldt pushed them gently back. When etiquette was satisfied he accepted them. They proved to be a famous historical novel—"San-kue-tchai," containing the history of the three kingdoms into which China was divided, after the *Han* dynasty. Humboldt told the commander that he intended to give the books to his brother, who was studying the Chinese language, and the commander desired him to inscribe his name, Chin-foo, upon them. He did so, and presented him with the pencil with

which he wrote. It was placed on the blue cloth, and borne away by his attendants.

Madeira, biscuits, and sugar were handed round to the guests. Chin-foo took a small piece of sugar, and drank one glass of wine. His attendants were not so moderate; they drank several glasses, tossing them down at a single draught, and devoured quantities of sugar, putting away their pipes for that purpose. Sugar was then handed round among the Mongols, who by this time had entered the tent, and stood like children, holding out their hands wistfully. After a time Chin-foo took his leave. The Mongols, full of curiosity, crowded around the Europeans, and touched them. They were much struck with one of the party who was corpulent, putting their hands round his stomach, and feeling him with their fingers. The travellers pushed them away, but they took it good-humouredly, and as a matter of course.

There were eighty men in these two stations, all dressed like their leaders, though their robes were of different colours, and were confined at the waist by a girdle. They were ragged, dirty, and mostly without arms. The weapons of those who were armed were bows and arrows. They seemed to set little store by them, for they offered to sell them to the travellers, together with their pipes and chopsticks, and the rest of the celestial knick-nacks. About the tents were a few camels, a flock of goats, and some sheep with enormous fat tails.

The travellers returned to Ustkamenogorsk, by the way of the Irstysch. The route was full of interest to Humboldt, for on the lonely shores of the river he saw

immense rocks of granite, lying horizontally and in layers, and resting on clay slate, whose layers were partly perpendicular and partly at an angle of eighty-five degrees. It was an important fact for him in his theory of granitic formations.

From Ustkamenogorsk the travellers proceeded to Miask. They were accompanied by a military escort of Cossacks, which was relieved at the different posts. These posts, which consisted of small fortified villages, at intervals of twenty or thirty versts, extended along the whole boundary, from the frontier of China to the Caspian Sea. Passing through Semipolatinsk, a town of considerable importance in the caravan trade of Central Asia, they followed the course of the Irstysch as far as Omsk. They arrived at Omsk on the 25th, and remained there two days, visiting the Cossack, military, and Asiatic schools, and pursuing their usual researches. They left the river at Omsk, and struck to the westward, across the steppe of Ischim, passing along the frontiers of the Middle Horde of Khirgises, and stopping by the way at Petropaulowsk and Troitsk. On the 3d of September they arrived at Miask.

They spent two weeks at Miask, visiting the gold workings in its vicinity, and making excursions to the Ilmen mountains, and the mines around Slatoust. The truth of Humboldt's theory of the existence of diamonds in the gold-sands of Asia was made known to them while at Miask; not through any discoveries of their own at this time, but by a messenger from Count Polier. They parted from the Count, who was on his way to his estates, as the reader will remember, on the 1st of July, at Kuschwinsk. He was strongly impressed with the

mineralogical ideas of Humboldt, so he examined all the works for gold-washing in the vicinity of Bissersk. On the 5th of July he reached the last of these works, about twenty-five versts from Bissersk, and entered it with M. Schmidt, a young mineralogist from Freyberg. In the sands which were brought to him, amongst a quantity of iron crystals and quartz, lay the first diamond of the Ural! It had been found the day before by Paul Popoff, a boy of fourteen, employed in the works. As a reward had been promised to those who should discover any valuable stones, the boy hastened with his prize to the overseer. The overseer taking it for a topaz, placed it among the other minerals for the Count's inspection. Its transparency was perfect, and the Count at once recognised it as a diamond. Within three days afterwards a second was found by another boy; and a few days after his departure from the works the Count received a third, larger than the two others put together.

As M. Schmidt had all the necessary instruments to examine the three crystals, and verify the discovery, the Count ordered him to take their specific gravity. The first two gems weighed together 3.520, the exact medium between the extremes assigned by mineralogists, as the specific gravity of the diamonds; there are 3,4 and 3,6. The absolute weight of the first was 0.105, or a little over half a carat.

Count Polier sent one of these diamonds to Humboldt by M. Schmidt, requesting him not to make the discovery public until the party should return to St. Petersburg, as he had not yet presented one to the Emperor. Before his departure from St. Petersburg, Humboldt was

confident of finding diamonds in the Ural, and jestingly declared to the Empress that he would not return without Russian diamonds. When the party returned to St. Petersburg in November, the Emperor alone had seen the Count's diamonds. Humboldt was the first who showed one to the Empress.

Count Polier made a circumstantial report of his discovery to the Minister of Finance, and commenced a letter on the subject to Arago and the "Annals of Chemistry," but died before he could finish it. The boy who discovered the first diamond was more fortunate, for his liberty was given him, and a sum of money besides.

From Miask Humboldt and his party proceeded southward to the head waters of the Uri. They passed a number of villages belonging to the Bashkirs, but not then peopled by them, for this tribe, leading a nomadic life in summer, occupied their houses only in the winter. Following the course of the southern Ural, the travellers came to Orsk, at the junction of the Or. This district was rich in quarries of green jasper, and the river Jaik, in its vicinity, presented some curious geological phenomena. The road from Orsk to Orenberg being the most dangerous one on the whole frontier, the authorities furnished Humboldt with a guard of Cossacks as a defence against the Khirgises.

On the 21st the party reached Orenberg. It was the capital of the district, the chief fortress on the line, and the centre of a vast caravan trade to all parts of Central Asia. The Governor-General being absent, the party were entertained by Major-General Gens. General Gens was deeply versed in the geography of Asia, for which he had collected many important materials, partly from

the caravans that traversed that country, and partly from his own travels. He told Humboldt of a lofty mountain situated to the north-east of the great Balkasch lake. This mountain had once been a volcano, and caravans in passing it were frequently disturbed by the storms which it occasioned. The inhabitants of the region in which it stood endeavoured to propitiate it by sacrifices of sheep. General Gens had not seen this singular mountain, but he knew a Tartar who had visited it, or pretended to have done so. It reminded Humboldt of the volcanoes mentioned in the Chinese books, as lying far from the ocean, the existence of which had divided the opinions of geologists. He made it the subject of his investigations, and subsequently obtained more accurate imformation concerning it from the Russian police-director of Semipolatinsk.

As Humboldt had seen but little of the Tartars that inhabited the regions along his route, General Gens sent a messenger to the nearest sultan of the Khirgises, and requested him to come with his people into the neighbourhood of Orenberg, and give the travellers a specimen of their games and sports. A large number of Khirgises soon made their appearance, and raised their tents a few versts from the city. Then the sultan came, and paid his respects to Gens and Humboldt.

They drove out to the encampment, surrounded by a band of Khirgises, who rode around the carriage at full gallop, resting with their hands on the backs of their horses, with their feet in the air. The sultan introduced the travellers to his wives who were seated in a row in his tent, and the sports began. The first was horse-racing. The jockeys drove off to the distance of seven

versts, and commenced galloping their horses back to the tents. In the meantime the spectators formed a ring, into which stepped two stout Khirgises to wrestle. Casting off their outer garments, they threw their leather girdles over each other, and struggled until one was thrown. When this was done another entered the ring and contested the prize with the victor, who remained there until he himself was thrown. One of the wrestlers threw six of his comrades in succession, but was vanquished by the seventh. Then a large kettle was brought out, half filled with boiled groats. Into this kettle General Gens tossed a silver ruble, which the Khirgises attempted to fish out with their teeth. Several added to their stock of small change by their dexterity in this sport, but the greater number besmeared their heads and shoulders in vain. Now came the musicians, a band of men who sang in long-drawn tones, and frightfully distorted their faces. Their singing was execrable, but they were so enraptured with it, that it was almost impossible to stop them. When they had finished, a veiled woman entered the circle, and sang in the same horrid manner. Then came two others who sang a duet. They stood with their faces close together, and were veiled; but in the course of the duet they raised their veils so that they could see each other, and at the same time give the spectators a side view of their charms, which piece of coquetry was not thrown away. But now the news spread that the horsemen were coming, whereupon the overseers plied their whips, and the crowd gave way. The first prize, a cloak embroidered with gold, was won by a boy. Then commenced the foot-race. The distance from the starting point to the sultan's tent was about a mile; it was run

by the winner in three minutes. The first prize was a silver ruble, the rest were pieces of cotton cloth, and smaller presents. When the sports were over, the travellers returned to the city, and prepared for their departure the next day.

From Orenberg they descended the Ural to Uralsk, the chief city of the Uralian Cossacks, where they remained a day to witness the autumnal fishing. Then turning to the north-east across the mountain steppe of Obschtschei Syrt, they proceeded to Busuluk, and from thence westwardly to the Volga at Samara. This region abounded with sulphur springs and waters impregnated with salt and asphaltes; in many places large quantities of sulphur were obtained from the earth. They descended the Volga, passing a number of German colonies on its banks, and came to Dubowka. From this place they made an excursion to the great salt lake of Elton, or *Altan Nor*, the Golden Lake, as it was called by the Cossacks. It was situated in the steppe, seventy miles to the eastward of the Volga, and was celebrated for its extensive salt manufactories. In this lake the travellers found large quantities of insects and birds, which had fallen into the water, and were preserved. From these salted specimens Ehrenberg made a good collection of the *fauna* of the region.

At Sarepta, further down the river, they visited a colony of Moravian brethren, who had established themselves there in 1765, since which time they had carried on a considerable traffic, chiefly of their own manufactures, with the Cossacks.

The lower districts of the Volga, were quite thickly settled by the Kalmucks; the travellers frequently passed

their houses, and sometimes met the people with their herds of horses, sheep, and camels. In the course of their journey they came to a Kalmuck temple. Before its entrance stood a number of upright sticks, like a clump of spears adorned with flags, or pennons. These pennons, which were long stripes of cotton cloth, were covered with Kalmuck prayers, written in the language of Thibet, which was always used by the priests in their religious rites, though unintelligible to their flock. The simple Kalmucks admired it, just as the simple Catholics admire Latin. It was a divine language, consecrated by the use of ages. Neither the priests nor the Kalmucks read these prayers, (the latter indeed could not:) they were fastened to the long sticks already mentioned, in order that the wind might wave them to and fro. The fluttering of these written supplications was considered as effectual as the repeating of them. If the god to whom they were addressed had eyes, and most of the gods of Asia were supposed to be rather liberally supplied in the matter of vision, he could see them, which would answer his purpose just as well as if he heard them. It was a capital test of his divinity, and it saved so much time!

The travellers entered the temple, and watched the Kalmucks at their worship.

Glaring pictures of grotesque idols, hung on the walls, and gilded images stood on the altar, before which were several basins containing fruit, water, dried flesh, cheese, and other offerings. Between the door and the altar were six priests, sitting face to face on the floor, the inferior priests nearest the door, the *Lama* beside the altar. They were singing and playing on a variety of instruments. It was difficult to tell which was worst

their chant or their music; both were execrable, harsh, discordant, noisy—a diabolical uproar. At last the *Lama* arose, the music ceased, and the priests came and talked with them.

The travellers came in sight of Astrachan on the afternoon of the 12th of October. They found a steamboat awaiting them at the ferry by the order of the Governor-General Ossipoff, and at once crossed over to the city, where they were received by the firing of cannon, and an immense crowd of spectators. They were conveyed by four-horse carriages to the spacious apartments allotted them, and the next day Humboldt was waited upon by the dignities of the city, and the deputies of the various nations represented in the population of Astrachan. The Governor-General presented them to the traveller in the order of rank. First came the burgomaster of the city and the elders of the mercantile profession, bringing the tokens of homage, in the shape of a large pound cake, ornamented with grapes, plums, pears, apples, and salt. Then came the nobles, and the officers of the garrison, and last the deputies of the Armenians, Persians, Hindoos, and Tartars, a motely but picturesque assemblage.

The travellers remained at Astrachan nine days, studying its diversified population, and visiting its bazars and temples. In one of these temples they saw a *fakir*, who sat crouching on the floor; his chin rested upon his knees, between which streamed his long white beard, that reached down to his feet. He had been sitting thus for fifteen years, with no clothing but a sheep skin, which was thrown loosely about him. He had forgot himself to marble.

They made a short excursion to the mouths of the Volga and the Caspian Sea, for the purpose of analysing its waters, obtaining specimens of its fish, and making barometric measurements. They then proceeded to visit Sered Dschab, a noted Calmuck prince, who resided near the Volga, fifty miles from Astrachan. He sent carriages and a large cavalcade to meet them at the landing-place, from which they were conducted to his residence, where he received them with great state, and entertained them royally. He showed them his temple, his horses, his orchards and gardens, and the distilleries where he manufactured brandy from mare's milk. Besides Sered Dschab himself, they met at his residence a neighbouring prince, Dschangir, the young Khan of the Inner Horde of Khirgises. They would willingly have spent some time at Astrachan, but as the weather was cold, and winter was drawing near, they were obliged to hasten their journey homeward. The day after their departure the country was covered with snow.

They retraced their route along the Volga to Zarizyn, and then crossed over to the Don, where Humboldt made his last barometric observation on the relative height of the Caspian Sea. They reached St. Petersburg on the 13th of November, after an absence of six months, during which they had travelled between eleven and twelve thousand miles.

On the 28th of December they were back in Berlin.

BOOK IV.

1829—1859.

CHAPTER I.

HUMBOLDT AT HOME.

FROM the time of his return from Central Asia till the day of his death, Humboldt resided in Berlin. His house was in the Oranienburger Strasse, at a little distance from the Spree. It was a quiet neighbourhood, in the northern part of the city, not far from the palace of the King. The palace was his home, too, whenever he chose to make it so; indeed, during a large portion of the year he might be said to reside with the King. When he gave up Paris for Berlin, he entered into closer relations with his sovereign than was enjoyed by any other person in the kingdom, outside the royal family. The tie that bound them was one of the noblest that ever bound a monarch and his subject. The King honoured Humboldt for his profound wisdom, and Humboldt respected the King for his many excellent qualities. It was a sincere disinterested friendship on both sides. The gain, however, was with the King, rather than with Humboldt, for the rank and emolument that he bestowed upon Humboldt were more than repaid by his society and conversation.

Besides his palace at Berlin the King had palaces at Potsdam and Charlottenburg. The Charlottenburg

palace was two or three miles from Berlin, outside the Brandenburg gate. It was built by the King on his marriage with the Princess Sophia Charlotte. The gardens in which it stood were prettily laid out, diversified with the windings of the Spree, and several small lakes filled with carp. These carp were trained to come at the sound of a bell, and pop their noses out of the water for crumbs.

At Potsdam there were four royal palaces, the most noted of which was the celebrated Sans Souci, built by Frederic the Great, in 1745–47. It stood on a terrace on the right of a broad avenue, which ran through the grounds. The grounds and gardens were laid out in the stiff formal French style of the last century; here embowered alleys and cut hedges, there statues of fawns and wood nymphs, and there fountains spouting foam in marble basins. Vines, olives, and oranges grew in hothouses. At the end of the terrace on which the palace was built were the graves of the great Frederic's favourite dogs, and of one of his horses that had borne him through many battles. Old Fritz loved this spot, and just before his death he used to be brought to it in a great arm-chair, to bask in the sun, with his dogs around him.

In the gardens of Sans Souci stood the Charlottenhof palace, built by Frederic William IV., when he was crown prince. It was in the style of a Pompeian dwelling, elegant and tasteful, with beautiful fountains, and an antique altar, and a number of statues and bronzes from Pompeii and Herculaneum. This was the King's favourite residence while at Potsdam, and here Humboldt generally resided when he visited him—several rooms being set apart for his exclusive use.

The commencement of 1830 found Humboldt and his companions, Rose and Ehrenberg, at work on their Asiatic journey, but some years elapsed before it was ready for publication. Humboldt's portion was ready first, which could hardly have been expected, a considerable portion of his time being taken up with his official duties. He sought the advice and assistance of his scientific friends, as was his custom when undertaking his great works. This obliged him to reside a while in Paris. He was also sent thither by the King, with a diplomatic mission, to acknowledge Louis Philippe and the new regimé. This was in September, 1830. In February, 1831, he filled another mission there, while his brother William, who had retired from politics shortly before the death of his wife, was decorated with the order of the Black Eagle at home, and admitted into the Council of State.

It was at this time that Humboldt first met Agassiz, then a poor student, now the celebrated Professor. "I was only twenty-four years of age," says Agassiz, in his touching tribute to the memory of Humboldt, "I was only twenty-four years of age when in Paris, whither I had gone with means given to me by a friend, but was as last about to resign my studies from want of ability to meet my expenses. Professor Mitscherlich was then on a visit to Paris, and I had seen him in the morning, when he had asked me what was the cause of my depressed feelings, and I told him that I had to go, for I had nothing left. The next morning as I was seated at breakfast, in front of the yard of the hotel where I lived, I saw the servant of Humboldt approach. He handed me a note, saying there was no answer, and disappeared.

I opened the note, and I see it now before me as distinctly as if I held the paper in my hand. It said:

"'My friend, I hear that you intend leaving Paris in consequence of some embarrassments. That shall not be. I wish you to remain here as long as the object for which you came is not accomplished. I inclose you a check for fifty pounds. It is a loan which you may repay when you can.'

"Some years afterwards, when I could have repaid him, I wrote, asking for the privilege of remaining for ever in his debt, knowing that this request would be more consonant to his feelings than the recovery of the money, and I am now in his debt. What he has done for me I know he has done for many others—in silence and unknown to the world.

"It is a circumstance worth noticing," continues Professor Agassiz, "that above all the great powers Prussia has more distinguished scientific and literary men among her diplomatists than any other State. And so Humboldt was actually a diplomatist in Paris; though he was placed in that position, not from choice, but in consequence of the benevolence of the King, who wanted to give him an opportunity of being in Paris as often and as long as he chose.

"But from that time there were two men in him, the diplomatist, living in the Hôtel des Princes, and the naturalist who roomed in the Rue de la Harpe, in a modest apartment in the second story, where his scientific friends had access to him every day before seven. After that he was frequently seen working in the library of the Institute until the time when the Grand Seigneur made his appearance at the court, or in the *salons* of Paris."

It was through Humboldt's liberality in 1833, that Agassiz was enabled to commence the publication of his great work on Fossil Fishes; and in the fulfilment of a mission suggested to the King of Prussia by the same kind friend, that he emigrated to the United States in 1846.

Besides filling the diplomatic mission which called him to Paris, Humboldt was busily engaged in seeing through the press, the first instalment of his journey to Central Asia. It was published in 1831, under the title of "Asiatic Fragments." It was not a narrative of the journey, for the writing of the narrative was assigned to Rose, but a dissertation in two octavo volumes, on geology and climatology. The first volume treats of the mountain-ridges and volcanoes of Central Asia, and of the various kinds of eruptions in different parts of that region, comparing them with similar eruptions in America. "He has everywhere interspersed," says Professor Klencke, "numerous geognostic observations and notes on the general formation of the soil between the Altai and the Himalaya mountains, and his communications on the remarkable occurrence of volcanoes in the middle of the continent, and far from the ocean, are of great interest. Here Humboldt placed science on a new footing, for he had had the special opportunity of observing the volcanoes in three different quarters of the world. He perceived that the volcanic phenomena could no longer be considered as belonging to geological developments, but that they must be explained by physical history in general, as the volcanic activity seemed to him to be the result of a continual communication between the interior of the earth, which is in a molten fluid condition, and

the atmosphere which surrounds the hardened and oxydized crust of our planet. On this theory he explained the still active and the extinct craters, the direction of the mountain-ridges, and the formations of the soil; he deciphered the traces of former terrestrial revolutions, their relative age, and the physical powers which have influenced and still influence the form of the earth's surface. Thus the masses of lava which pour from the craters were to him the petrified streams of formerly gushing springs of the interior of the earth; from the connection and similarity of effects he traced the causes and conditions of the formation of rocks and superincumbent strata, of the chemical results of volcanic eruptions, of elevations and depressions of the earth's surface. By the strictest investigation of all occurring new appearances, and by penetrating combination of analogous, observed facts, he explained numerous physical and geological problems, whose exact solution had hitherto been deemed impossible. Humboldt thinks that the volcanic activity of our earth, compared to former ages, is considerably decreased; it can no longer bring forth new elevations or heat in the north, but can only produce small craters, and an agitation of the earth's surface. Before the advent of man into terrestrial nature, a tropical, animal, and vegetable world flourished everywhere on the volcanically-heated earth; now, on the cooled planet, the petrified surface only receives warmth from the sun, the tropical luxuriance died out towards the north, and only flourishes where the sun can exercise its perpendicular influence over the tropics.

In those remote ages of the boiling centre of our earthball the hot fluid and the gases it generated often and on

many points burst through the firm crust with tremendous force, made clefts and depressions in it into which the molten masses of metal, basalt, and other matter flowed, which were petrified, and now lie in the thus-formed mountain ridges. Thus arose the Cordilleras of the Andes, the Himalaya mountains, and thus was petrified the waving surface of the broken soil into those hills and valleys which transform our plains into picturesque landscapes. From these causes Humboldt explained the peculiarities of the Asiatic soil. It was in consequence of the volcanic power which raised mountains and continents, and swelled up the earth-crust bubbling like a gigantic vault, that these hollow vaults sank down in the course of ages, and thus Humboldt established that the depression of the surface of the old world, where the level of the Caspian Sea, like that of the Sea of Ural, lies two hundred or three hundred feet below the level of the ocean, and where the depression of the firm soil extends as far as Orenberg, Saratow, and south-east, probably as far as the so-called central plain, is nothing but a crater-land like that of the moon, where the large points, above one hundred miles broad, called Hipparch, Archimedes, and Ptolemy, form a basin formation such as exists also nearer home; for instance, in Bohemia.

Before Humboldt's journey into the interior of Asia, there existed many erroneous notions of the geography, the connexion of the mountain-chains, and the productions of the soil of those districts, but an entirely new view of the country was acquired through this bold and penetrating traveller, who made a large number of independent latitude measurements, and who obtained varied information on travelling routes and local circumstances

from travelled Tartars, Bulgarians, and Taschkents, as well as from the Russian officers. The inner, central part of Asia was not, as had been supposed, an immense agglomeration of mountains, nor an uninterrupted tableland, for Humboldt established that this part of the world was crossed from east to west by four mountain-systems (by the Altai, which ends westward in the Kirghiz district, by the Himmelsberg, by Kuenlun, and by the Himalaya), which have exercised authenticated influence on the historical migrations of nations. And thus Humboldt discovered a volcanic territory in the centre of Asia, which is one thousand to one thousand four hundred miles distant from the ocean, and which presents a surface of two thousand five hundred geographical miles.

The second volume of the "Asiatic Fragments" contains, besides the description of the twelve routes, "Observations on the Temperature and the Hygrometric Condition of the Atmosphere in some portions of Asia, and Investigations into the Causes of the Deflection of the Isothermic Lines"—namely, the imaginary lines which unite all points on the earth of equal mean temperature. In this volume we have important contributions to a climatic knowledge of that country, and in it are indicated also the causes which produce the deflection of the isothermic lines from the parallel circles. These results, based on numerous astronomic and magnetic measurements, throw an entirely new light on this branch of science, and are again closely connected with the results of the former American journey, as Humboldt had there also construed the terrestrial laws from similar phenomena in the old and new world."

"But the Asiatic journey," continues the Professor, "became of vast importance in its more extensive results. Where Humboldt could not himself institute observations, he arranged further studies for others, with prudence and foresight. In many parts of Siberia, he left carefully compared thermometers in the hands of competent and intelligent persons, and awakened the taste for these measurements and comparative experiments, especially among the Russian mining superintendents of the Ural Mountains. In addition to this, he gained the assistance of the imperial academy of St. Petersburg, by submitting to them an excellently regulated plan for instituting over the entire extent of the Russian empire a regular system of observations on the daily changes in the state of barometer, thermometer, and hygrometer, on the temperature of the air, the direction of the wind, and the moisture of the atmosphere. The interest which all the members of the Academy took in Humboldt's plan was increased by the Emperor's interest; and if it is taken into account that the Russian empire presents a surface larger than the whole visible surface of the moon, it will be comprehended what important laws of terrestrial organization can be deduced and revealed by contemporary and comparative observations over such a large field. The Russian government at once acknowledged the importance of these plans, and instituted a physical observatory in St. Petersburg, whose task it was to choose the other observatory stations, to compare and adjust the instruments with which the experiments were to be made; accurately to determine the astronomical position of the stations selected, to superintend and direct the magnetic and meteorologic researches,

to arrange the collected results, to calculate them, and to publish the mean results."

After the publication of the "Asiatic Fragments," Humboldt returned to Berlin, stopping on his way at Weimar to see Goethe. "I owe some hours of a frank friendly conversation with your brother," Goethe wrote to William Von Humboldt on the 1st of December, 1831, "for whom I can find no expressive title. For although his view of accepting and operating on geological objects is quite impossible for my cerebral organs, I have seen with real interest and admiration how that of which I cannot convince myself, is with him clearly deduced, and enters into combination with the stupendous mass of his knowledge, where it is then digested by his most estimable character." A few months more, and Goethe was dead.

The next six or seven years of Humboldt's life were devoid of incident. His time was principally spent at Berlin with the King, and at Tegel with his brother William. Indeed all the time that he could spare from his official duties was devoted to William. The death of Frau Caroline brought them more closely together; the blow that robbed William of his wife gave him back his brother. Not that there had ever been a shadow of estrangement between them, but in their case, as in thousands of others, death seemed to reveal them more fully to each other. Their hearts were cemented by sorrow. Besides this there was another bond between them—the growing consciousness that William's health was declining. The blow that struck down Frau Caroline seemed to have wounded him also, for from the day of her death he was changed. His nerves were shattered; he stooped and tottered in his gait, and his whole body

trembled. It was evident that one of "the German Dioscuri," as the brothers were called, was on his way to the Silent Land. One by one the friends of his youth went before him. First Niebuhr and Stein; then Goethe and Gentz, and then Hegel and Schleiermacher. Then it was his turn. It was his custom to visit his wife's grave on the anniversary of her birthday, and it cost him at last his life; for on one of these solemn festivals of his soul he caught a severe cold, which hastened his death. Three days before he died Alexander wrote concerning him to their mutual friend, Varnhagen Von Ense. Here is his letter.

"BERLIN, 6 *o'clock a.m.*, 5*th April*, 1835.

"You, my dear Varnhagen, who do not fear pain, but consider it reflectively in the depth of the feelings, you must receive a few words of love which the two brothers feel for you in this mournful time. The dissolution has not taken place yet. I left him at eleven o'clock last night, and now hasten thither again. Yesterday was a less painful day: he was in a half soporific condition, had much and not very restless sleep; and at each awaking, words of love and consolation, and the clearness of his great intellect, which comprehends everything, and examines its own condition. His voice was very weak, hoarse, and sharp, like a child's, therefore the physician applied leeches to the larynx. He is perfectly conscious. 'Think often of me,' he said, the day before yesterday, 'but always cheerfully. I have been very happy; to-day also was a happy day for me, for love is the greatest happiness. I shall soon be with your mother, and comprehend the laws of the higher world.' I have no hope.

I did not think my old eyes could shed so many tears It has now lasted eight days.

"A. V. HUMBOLDT."

Three days passed,—three long and dreary days of suffering and sorrow, and all was over. He died in his brother's arms.

"I had the misfortune to lose my brother the day before yesterday," Humboldt wrote to Arago, "and am in the most profound grief. In great distress we think of those dearest to us, and I feel a slight consolation in writing to you. We saw him dying for six days. His weakness had painfully increased during the last week; a continued trembling had shown itself in all his limbs, but his mind had retained all its native vigor. He laboured ceaselessly, and leaves two almost finished works; one on the languages of the Indian archipelago, derived from the Sanscrit; the other, on the origin and philosophy of languages in general. These works will be published. My brother has left his manuscripts, his commenced works, and his valuable collection of books, to the public library. He died of an inflammation of the lungs, watching, with painful sagacity, the progress of the disease. His was a high intellect, and his soul was full of elevation and nobility. I feel very isolated."

William Von Humboldt was buried on Palm Sunday. At eleven o'clock the procession started from the castle. First came the hearse covered with crape and drawn by four horses, followed by Alexander and William's children and grand-children; then a number of noble personages from Berlin, Prince William, the King's brother, several generals and statesmen, and a long train of scholars

and artists: and then the people of the village, who showed their affection for the dead man's memory by following his body to the grave, singing hymns and psalms as they went. The solemn procession wound its way through the grounds until it reached the monument which William had erected for his wife. It stood at the end of an alley of cypress, in a spot of the park to which Frau Caroline had been partial, and which she had chosen for a resting-place. Upon the summit of this monument, stood a statue of Hope, by Thorwaldsen. Under this divine angel, by the side of his dead wife, the great scholar was laid with prayers and many tears.

"You should have known my brother William," Alexander used to say in after years: "he was always the cleverest of us two brothers."

There is a period in our lives when we think that grief will kill us. It is in youth when we are ignorant, not in age when we are wise. Age teaches us many things, not the least of which is our power of endurance. Humboldt felt that he was desolate after his brother's death, but he also felt that he could endure his desolation. He had many consolations left him still,—his friends, his books, his inextinguishable thirst for knowledge. As we have given a glimpse of his private life, let us reverse the medal, and show him as he appeared to the public at this time.

"When, in the years 1834–5," says the author of *Berlin and the Berliners*, "we young students thronged into lecture room No. VIII., at eight o'clock on winter mornings, to hear Böckh on Greek literature and antiquities, we used to see in the crowd of students in the dark corridor, a small, white-haired, old, and happy-looking man,

dressed in a long brown coat. This man was the *studiosus philologiæ*, Alexander Von Humboldt, who came, as he said, to go through again what he had neglected in his youth. When we met him in the lecture-room we respectfully made way for him; for though we had no respect for anybody, especially professors, Humboldt was an exception, for he knew 'a hellish deal.' To his own honour, the German student still respects this quality. During the lecture Humboldt sat on the fourth or fifth bench near the window, where he drew a piece of paper from a portfolio in his pocket, and took notes. In going home he liked to accompany Böckh, so as in conversation to build some logical bridge or other from the old world to the new, after his ingenious fashion. There was then in the class a man who has since distinguished himself in political literature, but whom we had nicknamed 'Mosherosh,' that is Calves'-head, on account of his stupid appearance. As Mosherosh generally came in late, it was the fashion to receive him with a magnificent round of stamping. One day, Humboldt too came late, and just at the usual time of Mosherosh, and without looking up we gave the regular round, while Humboldt, blushing and embarrassed, made his way to his place. In a moment the mistake was seen, and a good-natured laugh succeeded. Humboldt also attended the evening lectures of Ritter on universal geography, and let the weather be as bad as it might, the gray-haired man never failed. If for a rarity he chanced not to come, we said among ourselves in students' jargon, 'Alexander cuts the college to-day, because he's gone to King's to tea.' Once, on occasion of discussing an important problem of physical geography, Ritter quoted him, and

everybody looked up at him. Humboldt bowed to us, with his usual good-nature, which put the youngsters into the happiest humour. We felt ourselves elevated by the presence of this great thinker and most laborious student. We seemed to be joined with him in the pursuit of great scientific ends."

Humboldt's next work of consequence was "A Critical Examination of the history of the Geography of the New Continent, and of the Progress of Nautical Astronomy in the 15th and 16th Centuries." It was written in French, and was published in five octavo volumes, at Paris, in 1836–39. He had once intended to write a history of Columbus—a task for which no one was so well fitted—and had employed the leisure hours of thirty years in collecting materials for it; but the multiplicity of his labours, in other directions, prevented him from completing it. He was not content, however, to lose his valuable materials, so he gave them to the world in the work just named. It is divided into four divisions. The first discusses the causes which prepared and led to the discovery of the New World. The second relates to Columbus, Amerigo Vespucci, and the dates of several important geographical discoveries. In the third he treats of the early maps of the New World, and of the time when the name America was first commonly used; the fourth is a history of the progress of nautical astronomy, and map-making in the fifteenth and sixteenth centuries. It is a fine subject, and Humboldt has handled it, as no one besides himself could have done; but it is not equal to what we conceive his Life of Columbus would have been, and we shall always regret that he abandoned his first intention.

In 1840 Humboldt published an account of his ascent of Chimborazo, and of the mean elevation of the continent of America, besides superintending the publication of the works of his brother William. He was also a member of the academic committee for the publication of the works of Frederic the Great. In January, 1842, he accompanied the King of Prussia to England, and was present with him at the baptism of the Prince of Wales. In May of the same year a new order awaited him, in connexion with the Order of Merit. This order was founded by Frederic the Great as a military order, only five non-military persons, of whom Voltaire was one, being admitted into it in his time. Frederic William IV. instituted a peace class of the Order of Merit, and His Excellency the Baron Von Humboldt was chosen Grand Chancellor.

Thirteen years had now passed since Humboldt had made his great Asiatic journey, and eleven years since his first book on the subject, the "Asiatic Fragments," appeared. During that time he had collected a multitude of fresh materials from his correspondents in Russia, and from the directors of the Observatory of St. Petersburg. So instead of preparing a second edition of the "Asiatic Fragments," which was called for, the first being out of print, he set about an entirely new work, which should give the result of the latest discoveries. He was assisted, as usual, by some of the most eminent men of the time; not so much by his former scientific co-labourers, for the subject was beyond the pale of their studies, as by a new and rising generation of naturalists and scholars; such men as Henrich Julius Klaproth, Stanislaus Julien, and Eugène Burnouf. Burnouf investigated

the ethnographical and geological portions of the subject in the ancient Zend books, while Julien and Klaproth devoted themselves to physical researches in Chinese, in which language both were profound scholars. The result of their labours was fused by Humboldt with his own, and published at Paris in 1843, in three octavo volumes. The title of the new work was "Central Asia," and the chief subjects that it treated of, were the mountain chains and climatology of that region.

"The result of the Asiatic journey," says Professor Klencke, "which Humboldt has given in his work on Central Asia, are very various, and cannot yet be combined under one common head. The most important new investigations which have here led to further inquiries, are the treatise on the mean altitude of the great continent of the earth, on the table-lands of the interior of Asia, on the mountain system of Kuenlun, on the depression of the Caspian Sea and its environs, below the level of the ocean; also historico-geographical investigations into the former course of the River Oxus, and communications on the boundary of perpetual snow. Besides this, the work contains plates, which give the mean temperature of more than three hundred places, and besides the voluminous geognostic revelations of the Ural, the volcanoes, the beds of gold, and on the produce of the gold washings in the Ural districts, and in Siberia, on the diamonds in the mountains, there are explanatory essays by Stanislaus Julien, on Chinese historical sources, additions by Klaproth, on volcanoes, notes by Valenciennes, on the sea-dogs of the Caspian Sea, &c. The work abounds in important results, and includes a chart of Central Asia, drawn by Humboldt

himself, which is prepared entirely according to the latest astronomic and altitude measurements. The calculation of the astronomical observations made for this purpose, in Siberia, was the last work of Humboldt's constant fellow-worker, Oltmans, who died soon after the completion of this task."

But let us for a moment leave these great works, and glance at their author.

"I visited Humboldt," said Professor Lieber, in his eloquent address before the New York Geographical Society, "I visited Humboldt at Potsdam in the year 1844, when he had reached, therefore, the age of seventy-five; for you know that he was born in that memorable year, 1769, in which Cuvier was born, and Wellington, and Chauteaubriand, and Napoleon, and Canning, and Walter Scott, and Mackintosh—just ten years after Schiller, just twenty after Goethe. Humboldt told me at that time that he was engaged in a work which he intended to call Kosmos; that he was obliged chiefly to write at night, for in the morning he studied and arranged materials, and in the evening he was expected to be with the King from 9 o'clock to about 11. After his return from the King he was engaged in writing until 1 or 2 o'clock.

"Humboldt, when in Berlin or Potsdam, was retained, if we may use a professional term, to join the evening circle of the King for the indicated hours. It was all, I believe, he was expected actually to perform in return for the titles, honours, and revenue which he was enjoying, except that the monarch sometimes selected him as a companion on his journeys. Humboldt described to me the character of these royal evening reunions. Every-

thing of interest, as the day brought it to notice, was there discussed. The drawing of a beautiful live oak, near Charleston, which a fair friend had made for me, was taken by Humboldt to that circle, where it attracted so much attention that he begged me to leave it, and he told me that the volume describing our aqueduct, which my friend, the author, now the President of our College, had given me at the time of its publication, and which I had then sent him, had furnished the topic of discussion for an entire week. We collected, he said, all possible works on ancient and modern aqueducts, and compared, discussed, and applied, for many successive evenings. Is there, then, a royal road to knowledge after all, when a Humboldt can be retained?

"May I extend your supposed permission of giving personal anecdotes, provided they are of a sufficiently biographical character, such as Plutarch, perhaps, would not have disdained to record? I desire to show what interest he took in everything connected with progress. I have reason to believe that it was chiefly owing to him that the King of Prussia offered me, not long after my visit, a chair to be created in the University of Berlin, exclusively dedicated to the science and art of Punishment, or to Pœnology. I had conversed with the Monarch on the superiority of solitary confinement at labour over all the other prison systems, when he concluded our interview with these words: 'I wish you would convince Mr. Von Humboldt of your views. He is rather opposed to them. I shall let him know that you will see him.'

"Humboldt and prison discipline sounded strange to my ears. I went and found that he loved truth better

than his own opinion or bias; and my suggestion that so comprehensive a University as that of Berlin, our common native city, ought to be honoured with having the first chair of pœnology, for which it was high time to carve out a distinct branch, treating of the convict in all his phases after the act of conviction, was seized upon at once by his liberal mind. He soon carried the Minister of Justice along with him, and the offer to which I have alluded was the consequence.

"On the other hand, a friend, whose name is perhaps more interwoven with the history of our canal than that of any other citizen, except Clinton, informs me that he had the pleasure of sitting by the side of Humboldt at a royal dinner, at Charlottenburg. During the whole time they were engaged in conversing almost exclusively on our great canal, and that greater one which ought to unite in everlasting wedlock the sturdy Atlantic and the teeming Pacific, having now yearned for one another for centuries. Humboldt spoke with a knowledge of details and a sagacious discernment which were surprising to my friend, well versed in all the details of these topics.

"Although it has been stated by high authority that the works of Humboldt show to every one who can 'read between the lines' an endeavour to present Nature in her totality, unconnected with Man, I cannot otherwise than state here that, on the contrary, it has ever appeared to me that this great man, studying nature in her details, and becoming what Bacon calls her interpreting priest, he elevates himself to those heights whence he can take a comprehensive view of her in connexion with man and the movements of

society, with language, economy, and exchange, institutions and architecture, which is to man almost like the nidifying instinct to the bird. Humboldt's tendency in this respect seems to me in its sphere not wholly dissimilar to the view which his friend Ritter takes of geo graphy in connexion with history."

"Some fifteen years ago," continued Professor Lieber, after speaking of a visit which he made to William Von Humboldt at Tegel; "some fifteen years ago, Humboldt presided over the annual meeting of Naturalists, then held at Berlin. In his opening speech he chiefly discoursed on the merits of Linnæus. He knew of Linnæus as Herodotus knew of Salamis and Thermopylæ; for the life of the great Swede overlapped by some ten years that of Humboldt, and all he there said of Linné seems to me to apply to himself with far greater force and on an enlarged scale. In that speech, too, I remember, he quoted his friend Schiller. Humboldt was, in a marked manner, of a poetic temperament. I do not believe that, without it, he would have been able to receive those living impressions of nature, and to combine what was singly received, in those vivid descriptions and in language so true and transparent, that they surprise the visitor of the scenes to this day. He had that constructive imagination—I do not speak now of inventive fancy—without which no man can be great in any branch, whether it belong to nature or to history.

"But yesterday an officer of our navy, whose profession has made him well acquainted with South America, by sea and land, and with the Andes—one of the Monuments of our Illustrious Man—told me that he knew of

no descriptions or rather characteristics, so true to living reality as Humboldt's Views of Nature, which he had perused and enjoyed on the spot.

"The power of collocation and shrewdness of connexion, the knowledge of detail and the absence of a desire to perceive things according to a system, the thirst for a knowledge of the Life of Nature and the constant wish to make all of us share in the treasures of his knowledge—his lucid style, which may raise his Kosmos to a German classic—these seem to me to characterize Humboldt in his studies of Nature, besides all that which he has done as a professional naturalist.

"Humboldt's name and life may be termed with strict propriety of language, international. He read and spoke English and Italian; he spoke and wrote Spanish with ease and correctness, and French almost as well as German; he lived for entire periods of many years in Paris, and counted many French among his best friends, yet not at the expense of patriotism. In that very speech at Berlin, which has been mentioned, he dwells with pleasure on the penetrating effect which the German mind has exercised on all the physical sciences no less than in the mental branches.

"Humboldt was a dweller in kingly palaces; a courtier, if you choose, and the son of a courtier, without a taint of servile flattery or of submission. He was rather the honoured guest of royalty. He loved liberty, and considered it a necessary element of our civilization. He was a sincere friend of substantial, institutional freedom. His mind often travelled to this country, and that he loved America (sometimes with sadness) is sufficiently shown, were it not otherwise well known, by the sin-

gular love which the Americans bore him. To me that little piece of news was inexpressibly touching which simply informed us that our Minister in Berlin, with the Americans now present at that city—a cluster of mourners from afar—formed part of his funeral procession, the only foreign nation thus represented.

"In his simplicity and genial warmth he did what many a bold man would have hesitated to do. I was present as a young and distant listener, when, at Rome, immediately after the Congress of Verona, the King of Prussia, Humboldt and Niebuhr conversed on the affairs of the day, and when the last-mentioned spoke in no flattering terms of the political views and antecedents of Arago, who, it is well known, was a very advanced Republican of the Gallican School, an uncompromising French Democrat. Frederick William III. simply abominated republicanism, yet when Niebuhr had finished, Humboldt said, with a sweetness which I vividly remember: 'Still this monster is the dearest friend I have in France.'

"Humboldt had all his brother's views of the necessity of the highest University education and of the widest possible popular education, and he gave impulse to many a scientific, historical, or ethnological expedition, fitted out even by foreign governments, for he was considered the counsellor of all.

"But I cannot dwell, here, any longer on his versatility and manifold aptitude. It is proved by the literature of almost every branch. If we read Barth on Central Africa, we find Humboldt; if we read Say's Political Economy, we find his name; if we study the history of the Nineteenth Century, we find his name in the diplo-

macy of Prussia and France; if we read general literature, we find his name in connexion with Schiller and Madame de Stael; if we look at modern maps, we find his isothermal lines; if we consult Grimm's dictionary of the German language, we find Humboldt as authority.

"That period has arrived to which Crœsus alluded in the memorable exclamation, Oh, Solon, Solon, Solon! and we are now allowed to say, that Humboldt was one of the most gifted, most fortunate, and most favoured mortals—favoured even with comeliness, with a brow so exquisitely formed that irrespective of its being the symbol of lofty thought, it is pleasant to look upon in his busts as a mere beautiful thing—favoured even in his name, so easily uttered by all nations which were destined to pronounce it.

"When we pray, not only for the kindly fruits of the earth, but also, as we ought to do, for the kindly fruits of the mind, let us always gratefully remember that He who gives all blessed things, has given to our age and to all posterity, such a man as Humboldt."

The publication of the narrative of the expedition to the Ural, by Rose, in 1837–42, and of Humboldt's "Central Asia" in 1843, gave the latter the leisure that he needed to begin the long-delayed "Kosmos." To the publication of this work, which was to embody the substance of his lectures delivered at Berlin in 1828–29, Humboldt had in some sort committed himself, before starting on the Asiatic journey. As he remembered only the outlines of his lectures (there were sixty-one in all, the reader will remember, and they were delivered without notes), he was obliged to go over the whole ground anew. He had begun to do so, we have already

seen, when Professor Lieber visited him in 1844; and from that time until within a few months of his death, he was engaged on this great undertaking. The idea of a work like "Kosmos" had been in his mind for nearly fifty years. It was, as it were, the sun of his life, and though his lesser works might seem for a while to obscure it, floating like clouds between it and the world of men, it was still there as radiant as ever, shining divinely in his limitless firmament of mind. One by one the clouds were drifted aside,—the royal pavilions of his genius, rich with purple and gold—and in the calm sweet evening of his age the world was enlightened as it never had been before.

Glorious old man! We love to think of thee and thy immortal task! We see thee in thy study, the floor around thee piled with books, the table before thee strewn with charts, the pen in thy fingers flying over the sheets of white paper, as thou thinkest "the thoughts of God," the Divine Conception that shaped the Kosmos, the universal World Poem, which thou art singing anew in thy grand old German tongue! Next to Milton, blind, old, poor, sitting at the door of his cottage in the sunshine, and dictating *his* long-delayed task,—"Paradise Lost," we know of no grander spectacle than the white-haired Humboldt writing "Kosmos" at midnight! The men were unlike in many things, one a dweller in kingly places, the other "fallen on evil days and evil tongues," but both had served the world through a long life, and both on the threshold of death were serving it still, each building a deathless poem. For "Kosmos" *is* a poem, though it lacks the jingle of rhythm.

The first volume of "Kosmos" was published in 1845,

the fifth and last in 1858. With the exception of a journey to Copenhagen in the former year, and an occasional visit to Paris (his last visit to the French capital was in October, 1847), Humboldt spent this time, the last twilight of the mellow evening of his life, at Berlin, Potsdam, and Tegel. The preface to the first volume of "Kosmos" is dated from Potsdam, and the preface to the last edition of the "Aspects of Nature" from Berlin. He was visited at the former place in 1847, by Stephens, the distinguished American traveller, recently deceased.

"Towards sunset, on the first of July," says Mr. Stephens, "the railroad cars from Hamburg brought me to the gate of Berlin. Entering the city the twilight of a northern summer illuminated the stately houses, and the broad avenue of Unter den Linden. Leaving the broad portal of the Brandenburgh gate, with the car of Victory on the top, carried off as a trophy by Napoleon, and after eight years of captivity restored to its place—and riding on to the other extremity of the avenue, I had before me at one view the Schloss Platz, or Palace Square, with the colossal palace, and all the most magnificent buildings of the city, all enlarged and made more grand by the mellow twilight, and exhibiting an architectural splendour hardly to be met with in any capital in Europe. Turning off on one side of the square, at nine o'clock, I was 'taking mine ease' in the salon of the Hotel de Russie.

"I had gone over in the Washington, the pioneer of the American mail steamers to Bremen, and was striking over the continent for a passeo on the Rhine, and to intercept the steamer at Southampton on her return to New York. I had but one day for Berlin. There was

but one object in it I had any special desire to see, and that was—Humboldt. I might visit Berlin again, the other monuments of the city would remain; but he might pass away.

"Early in the morning I called upon Mr. Donaldson, our minister, and to my extreme regret learned from him that Baron Humboldt was with the king at Potsdam, thirty miles distant, in feeble health, and unable to receive visitors. Fortunately I had occasion to call upon Baron Von Rœnne, formerly Prussian Minister to this country, and incidentally mentioning to him my disappointment and regret, he stopped me abruptly, and with friendly earnestness said, that I must not leave Berlin without seeing Baron Humboldt, at the same time looking at his watch, calling up my servant, telling him that the cars for Potsdam started at twelve; and hastily writing a line of introduction, without allowing me time for acknowledgments, he hurried me off to my carriage. A brisk ride brought me to the *depôt* just in time for the cars; three quarters of an hour carried us to Potsdam, and almost before I had recovered from my surprise I was at Baron Humboldt's residence.

"It was in the royal palace, a stately and historic pile, once the residence of Frederick the Great, with his apartments remaining in the same state in which he left them. One wing was now occupied by Baron Humboldt, and it seemed a just tribute and a right reward—a proper crowning of his fame, alike honourable to prince and subject, that after years of travel, of physical and intellectual labour, he should, in the evening of his days, return to the town in which he was born, to live in the royal palace, the guest and friend of his king.

"Ascending to the door of his apartments I was disappointed anew by positive word from the servant in attendance, that the Baron would not receive any visitors that day. With very little hope of success, but disposed to try every chance, I left my letter, and card, with an intimation that I would call again at two o'clock.

"On my return, the expression of the servant's face as he opened the door relieved me of all apprehension. Showing me into an adjoining apartment, Baron Humboldt came to meet me with the flattering greeting that no letter of introduction was necessary.

"I was entirely mistaken in the idea I had formed of his personal appearance, and was surprised at not finding him bowed down and bent by age. Nearly half a century ago, he had filled the first place in the world of letters, sitting as it were, upon a throne, lighting up the pathway of science to the philosopher, and teaching the schoolboy at his desk. He was recorded in the annals of a long generation. Indeed, his reign had been so long, and his fame went back so far, that until I saw him bodily I had almost regarded him as a part of history, and belonging to the past; even then, alone, and in the stillness of the palace, I could hardly keep from looking at him as something monumental, receiving the tribute of posthumous fame.

"He is now nearly eighty, but has the appearance of being some years younger. In stature he is rather under than above the middle size, with a frame, probably in youth, well fitted for the hardships of his arduous travels. His head might serve as a study for a craniologist; his face is broad, and his eye remarkable for its intellect and expression. He was dressed in a plain suit of black,

without ribands or decorations of any kind, and his apartments corresponded with the simplicity of his personal appearance. He was debilitated from an attack of illness, but the vigour and elasticity of his mind were unimpaired. He spoke English with much fluency, but with an accent, and his manner of speaking and the tone of his conversation reminded me of Mr. Gallatin, who was an old personal friend, and to whom he wished to be remembered.

"The ruined cities of America, being the means of bringing me to his acquaintance, were of course the first subject referred to, but learning that my connexion with the line of mail steamers to Bremen was the immediate object which had brought me to Germany, he expressed his satisfaction that I was identified with an enterprise at that moment most interesting to Germany. He considered the action of our government in establishing the line, wise and statesmanlike, as, for a commercial people like ours, it must be the means of opening new relations, and a wide field for the enterprise of our citizens. He himself felt a lively interest in its success, believing that the Germans of all classes were desirous of direct intercourse with us; that they had a great variety of manufactures which might be exchanged to advantage for the large amount of our staples now consumed in that country, when more frequent intercourse should give a better knowledge of each other's wants and resources; as between the United States and Germany there never could be any feeling of rivalry, or any cause of collision, and the closer we could be drawn together the better it would be for both countries. He spoke of the long lines of railroads now constructing in Germany, to connect

the Rhine and the Danube, the Adriatic and the North Sea, with branches from towns and manufacturing districts, winding into each other all over the country, furnishing facilities for travel and transportation to the seaboard, such as had never been known before, the greater part of which, both as a matter of feeling, and on the score of interest, must in the first instance turn to the United States.

"He inquired about Mr. Wheaton, our late Minister to that country, whether he had arrived in the United States before my departure, and what was to be his future career. He said that it was understood at Berlin that he was to be appointed Minister to France, and expressed his surprise that the United States should be willing to lose the public services of one so long trained in the school of diplomacy, and so well acquainted with the political institutions of Europe.

"Although I had heard Baron Humboldt spoken of as one of the privy councillors of the king, I did not expect to find him, at his advanced age, and with his great work Kosmos to occupy his mind, bestowing much of his attention on political relations; but the political condition of Prussia, and indeed of the world, seemed to be the subject which interested him most. It was in fact just at that moment an interesting point in the history of Prussia. The long-called-for Diet, which had been looked to with great anxiety throughout all Germany, had closed its session but two days before my arrival. For the first time in the history of Prussia, delegates had been permitted to appear at the capital, and, in the hearing of the king, discuss the measures of his government. Great reforms had been proposed, and boldly and

fearlessly debated. The debates had been published, and the voice of a liberal party heard all over Germany.

"Baron Humboldt himself is a liberal, a firm believer in progress and improvement, known and recognised as sympathizing with that great political party which has for its lofty aim the greatest good to the greatest number, bettering the condition of the masses, and increasing the sum of human happiness; and while throughout the civilized world he has filled 'the measure of his fame' as a traveller and philosopher, in Prussia he is regarded besides as one of her soundest and best statesmen.

"Out of Europe, Mexico seemed to be the country which interested him most; perhaps from its connexion with those countries which had brought me to his acquaintance, or, more probably, because it was the foundation of his own early fame. He spoke of Mr. Prescott's History of the Conquest, and said that I might, when the opportunity offered, say to that gentleman, as from himself, that there was no historian of the age, in England or Germany, equal to him.

"And he was keenly alive to the present condition of Mexico; he was full of our Mexican war; his eyes were upon General Taylor and the American army. I was well aware that, in the conduct of this war, General Taylor was drawing upon himself the eyes of all Europe; and that, whatever might be the differences of opinion as to its necessity or justice, it was producing everywhere, in monarchical and anti-republican countries, a strong impression of our ability and power for war—which in enlightened (?) Europe, even at this day, more than all the fruits of peace, industry, and extended commerce, more than the exhibition of twenty millions of people

abounding in all the comforts of life, raises us to the rank of a 'first-rate power,' and makes us 'respected.'

"Baron Humboldt said that with one of his own maps before them, the king and his military council had followed General Taylor from his encampment at Corpus Christi, to Palo Alto and Resaca de la Palma, through the storming of Monterey, and the bloody scenes of Buena Vista. They had fought over all his battles, and, with his positions all marked on the map, were then looking for further tidings. They had seen and appreciated all his difficulties at Buena Vista. In Prussia war is a science, and according to the leading policy of Europe, to be always ready for war, every male in Prussia, the highest nobleman's son not excepted, is compelled to serve his regular turn in the army. In the teeth of all settled opinions, and as it were, upsetting the whole doctrine of standing armies, General Taylor, with a handful of regulars, and a small body of volunteers who had never been in battle, had stood up for a whole day against a murderous fire, and had finally defeated four times his number. Field-marshals and generals of Prussia, among them veterans who had studied the art of war on the great battle-fields of Europe, were struck with admiration at the daring and skill displayed at Buena Vista; and this admiration, Baron Humboldt said, they expressed without reserve, freely, publicly, and everywhere. Amidst the bitterness and malignity of the English press, it was grateful to hear from such lips, that the leading military men of a military nation did justice to the intrepidity of our volunteers, and to the courage, skill, and high military talents of General Taylor; while Baron Humboldt's comments upon his

dispatches and orders, and in fact upon all that related to him personally in the conduct of the war, were such as no American could listen to without feeling proud.

"I had occupied, without any interruption, more than an hour of Baron Humboldt's time, when the servant entered to summon him to dinner—with the king. I would have left him at once, but courteously saying that if late, he would excuse himself by mentioning the cause that detained him; he urged me to remain a few days for the purpose of making certain acquaintances at Berlin, and, pressed as he was, insisted upon giving me a line to a distinguished gentleman of that place, without seeing whom he said I ought not to leave. Circumstances did not permit me to deliver the letter; but I had the satisfaction of bringing it home with me, written in German, in a strong, firm hand, as an autograph of Humboldt, and a memento of one of my most interesting incidents of travel."

Among the multitudes of all nations who visited Humboldt in his last years, none were so warmly received as those who came from America: to be an American was an almost certain passport to his presence, and if the visitor was not ill-bred, to his favour. He seemed to have a love for the people of the United States; he appreciated the youth of their country, and he admired their freshness and enthusiasm. "He who knew our continent so well," says Bancroft, the historian, who visited him in Paris in 1820, and again in 1847; "he who knew our continent so well, knew the relations of the United States towards every part of it, and formed his judgments respecting the gradual advancement of the United States in the extent of its territory—judged us

greatly, judged us calmly, with the best and most fervent wishes for our welfare, with no disinclination to our increase of territory. Wishing especially that California and all the noble tract of land which now belongs to us on the Pacific might come to us, expressing only his apprehensions of the extent of territory that circumstances might step in and interfere with the proper development of free institutions. I have never heard any one discuss these questions of our relations to Mexico and our relations to Cuba more calmly and more candidly, and with more gentleness towards us, and with more full and perfect intimacy of all the circumstances that would attend any further progress on our part. He was always the friend of Young America. He measured his regard for us not by any merits that we might have, but by the goodness of his own heart. He was always ready to pour out his thoughts, his sympathies, and his encouragements to any young man that came within his influence. I remember, in 1820, having at that early period bestowed a good deal of attention to the study of languages, and, among others, the aboriginal languages of our own country; he particularly pointed out the proper methods of continuing inquiries and investigations on the subject. These ideas he not only communicated by word of mouth, but he wrote them out at considerable length, and I had the satisfaction, when I returned, to communicate them to persons engaged in that branch of study, and I doubt not that in some degree they contributed to the development of an acquaintance with the aboriginal languages of this country."

"It has been my good fortune," says an American correspondent of *The Commercial Advertiser*, writing from

Berlin on the 1st of January, 1850: "it has been my good fortune to see the patriarch of modern science, Alexander Von Humboldt. During the summer, and in fact up to the last week, he resided in Potsdam, in the royal palace; when the king removed to Charlottenburg he returned to his own residence in Berlin. One of his friends, to whom I am already indebted for many kindnesses, offered to present me to him, and wrote a note to solicit an interview. This is necessary, as casual visitors are rarely or never admitted. The first post of the next morning brought the answer, written evidently before daybreak, and mailed before seven o'clock. He fixed the hour at one o'clook on the 29th. But on that day a second note informed us that Mr. Humboldt was unexpectedly called to attend some court ceremony at the appointed hour, and so begged us to defer our visit until the 30th, at the same hour. I mention this as an illustration of his attention to small things. He does not consider himself exempted from the performance of all the minor duties of social intercourse. Exactly at the appointed hour we were at his door. The house is plain and comfortable, just like the other three-story houses of Berlin, in its dull, clay-yellow colour. The entrance is by a large carriage door, persons driving in and descending at the foot of the stairway.

"Humboldt occupies the second floor. A tall, well-fed servant in livery answered the bell, and ushered us into a small anteroom, where we laid aside our cloaks and hats, and waited until our visit should be announced. We had scarcely time to see that a large picture on wood, after the old Flemish school, hung on the wall, and to admire some stuffed birds, admirable specimens of taxi-

dermic skill, which stood on a round table, before the servant reappeared and conducted us through a large room, the walls of which, from ceiling to floor, were covered with books, plainly shelved up, into the room of Humboldt himself. He met us at the door, and received us very cordially. I must confess that my first impression was one of disappointment, for his busts and pictures had given me the idea of a man nearly six feet high, rather stoutly built, and erect as an arrow. Instead of this there stood before me a man of middle height, his once robust frame and limbs meagre with age, and his head drooping and shoulders bowed under the weight of more than four score summers. Behind him stood a tall, rosy-complexioned professor from Bonn, some fifty years of age, and at first my eye fell on him as the person more nearly approaching my ideal of Humboldt; but a single glance convinced me that he had not yet lived his half century. This ideal is the one common to all the world who have not seen Humboldt, for everybody that has seen him seems to delight in repeating that age has not touched his noble faculties, or abated his bodily vigour. It is very natural to us to excuse our want of acquirements by attributing supernatural qualities to those who excel us so far as to be unapproachable. But in the case of Humboldt the miraculous escape from the effects of age does not exist. He appears as old as he really is, but in a fine state of preservation—the result of constant temperance, and active exercise in the open air from youth, and of carefully avoiding all unnecessary exposure, and all extreme emotions, but at the same time cultivating his affections, and the genial part of his nature.

"He commenced the conversation in English, with an apology for his imperfect style, and spoke in that language during a greater part of the interview. Truth requires me to say that Mr. Humboldt knows, far better than his too hasty admirers, his proficiency in that language. Contrary to the assertion generally made so loosely, I must agree with him that he does not speak it perfectly, though well, and with great fluency. A foreign accent made his English less intelligible than his French, which he speaks elegantly, and like a native. In speaking of the French *savant*, Nicolet, he adopted that language, and his wit and playful humour appeared in a very favourable light. Here, for the first time, I recognised the literary artist, whose taste and genius have won undying renown, and in the quiet satire and richness of the style that inimitable power of word-painting and felicity of expression, which make the pages of his hundred books so fascinating. I felt now the charm of that eloquence which has convinced so many that age has not affected the philosopher, either physically or mentally. It was indeed surprising: there was all the fire and spirit of thirty on the lips of the man of fourscore. He sat generally with his head bowed on his breast, but when he became interested would raise it and look on his visitors, while a warm and genial smile would play across his features. He has the expression of a man of great goodness of heart, without weakness, and the polished and simple manner of a veteran courtier. There is nothing flabby about the face, the flesh being firm and solid. His head is not remarkable for size, but the forehead is high and smooth, without the protuberances which phrenologists usually assign to the

perceptive organs of such men. It is, I should say, a head of remarkably harmonious development, and not singular in its appearance, unless it be a singularity that it is not yet bald, but covered with long thin white hair.

"The conversation ran on numerous topics. He had just received a pamphlet published by one of our astronomers, Mr. G., in which Sir John Herschel is attacked. This he regretted, and made some remarks on the favourable opinion Herschel had always had of America, and her scientific men. He inquired with interest after Mr. Bache, and his progress towards the survey of our coasts, and seemed quite familiar with the state of policy his appointment had produced among the gentlemen of the navy. 'The navy officers always object to an appointment of that kind when not made from their own number, no matter how competent and efficient the person may be.' Speaking of Professor Agassiz, he said, 'You Americans have made a fine acquisition there. Agassiz would be distinguished, even in Europe, for his attainments in various branches of natural history. Perhaps he is a little too unbending in his theory of the effect of glaciers on the change of the general climate of the world. However, he has thrown a great deal of light on that subject, having made personally many very excellent experiments and observations.' The mention of glaciers led naturally to that of persons who had explored them, and of exploring voyages to the north. One of us asked his opinion as to the fate of Franklin. He thought it quite probable that Franklin had not perished, but was still shut in by the ice, and gave several facts of voyagers whom he had seen, and who had been for long seasons

so detained in the northern seas. The Esquimaux of the coast, he said, were not at all dangerous; Franklin was well supplied with provisions, and would probably yet return to give an account of his voyage. Indeed the report that the Esquimaux Indians had said that some vessels had long been frozen fast in the ice, away off to the north, seemed to be fully confirmed.

"He praised the United States for its generous initiative in matters of science, and said that the expedition to Chili, for scientific purposes, would not have been undertaken by any country in Europe. He had on the desk near him a letter, which he had apparently been reading when we came in. His eyes falling on it, he asked, 'Do either of you know a Lord K., who is now travelling on the continent?' On the reply that we had not the honour of his lordship's acquaintance, and indeed had never heard of him, he said that he had just received the most extraordinary letter from him. 'He writes me from Dresden that he will shortly be in Berlin, and will be most happy to make my acquaintance, and that I must certainly dine with him and a few friends at two o'clock on the 3d, at the British Hotel. He expects an old man like me to come from Potsdam in the middle of winter to dine with a lord whom I know nothing about. This is one of the antics of an eccentric class.' He then went on in some gay and delicately-humoured remarks on the eccentricity of Englishmen, which, if I could put them on paper as he uttered them, would be read with great relish by the lovers of true wit, and by none more than the English themselves. They reminded me of the lively sallies of the Parisian wit, Philarete Chasles. One of us told him that Captain Stone had left for Egypt and

Jerusalem. Mr. Humboldt expressed the pleasure he had derived from his acquaintance, and wished to know whether the Captain was aware that he had put his name in the last volume of the recent edition of the work, *The Aspects of Nature.* This is in connection with the account of the Captain's visit to Popocatepetl. He then showed us the English translation of this work by Mrs. Sabine.

"The name of Colonel Fremont happening to be mentioned, Humboldt spoke in high praise of his contributions to geographical science, and thought it unfortunate he had returned as a prisoner by the very road which he travelled as an explorer. He thought the day would come when Col. Fremont's works would be much better appreciated than at present. He expressed the opinion that the probable produce of the Californian gold mines had been over estimated, for that up to the present time the yield had been much less than that of the Russian mines, the latter having often produced annually thirty millions of dollars. No such large pieces had been found in California. One solid piece of eighty pounds had been found in Russia, and many of forty, thirty, twenty, and sixteen. He was surprised that no platina had been found. These are only a few of the remarks made in a conversation, which he, of course, conducted almost without remarks on our side. He seems to have an inexhaustible store of facts, and to be accurately informed about everything and everybody. His friend said, after we came away, that the way to hear him to the greatest advantage was to ask his opinion on any given point, when his wonderful knowledge would be brought to bear upon it in a manner most satisfactory to any sceptic as to the extent and minuteness of his information. We left,

quite charmed with the noble and genial nature whose richness has made it the glory of the age.

"The habits of Humboldt are not remarkable, except in the limited number of hours necessary to sleep and in temperance and regularity. His time is systematically divided. He rises at six in the winter, and five in the summer, studies two hours, drinks a cup of coffee, returns to his study, and commences the task of answering his letters, of which he receives yearly more than one hundred thousand. (I have heard this number doubled, but dislike to seem to exaggerate.) From twelve until two he receives visits, and returns to work at two. At four he dines, in summer with the king, in winter at home. From four until eleven he passes at the table, and generally in company with the king, but sometimes at the meetings of learned societies, or in the company of his friends. At eleven he retires to his study, and continues there until one or two, answering letters, or writing his books, or preparing them by study. His best books have all been written at midnight. He sleeps four hours, it having been a peculiarity in his family to require little sleep. Now, if anybody thinks that by sleeping only four hours, and studying at midnight, he may equal Humboldt in varied attainments, let him first be sure that he possesses another of Humboldt's peculiarities, namely, genius.

"His early inclinations led him to the p ursuits in which he has since so distinguished himself. At twenty-three he was in such repute for his knowledge that he was appointed first assessor of the mines of Prussia. From a very early age, then, up to the present time, about two-thirds of a century, he has been indefatigable in the pur-

suit of knowledge. He has brought to this pursuit a rare susceptibility to the charms of nature, a heart capable of feeling, and a head of generalizing. His fortune and rank have ever given him the best advantages of every kind. If he had not been a *savant*, he might have been an artist or a poet, for his works show taste and imagination of the most exquisite perfection. Most of his writings will compare in elegance with the purest classics of Germany. In short, he is one of the most harmoniously developed characters the world has ever seen, and posterity will reserve for him a higher niche in the temple of fame, than for the bloody heroes who have dazzled the world for a moment by their engineer talent of manœuvring masses of troops."

Some years later there came to Berlin a young American traveller, who, younger than Humboldt, when he made his great American journey, had already travelled extensively in four continents, and written several books of travel, which the world had pronounced unequalled of their kind. He lacked Humboldt's universal knowledge of science, for what traveller, ancient or modern, ever possessed it? but in word-painting—in the power of making the landscapes that he had seen, glow on his pages, as on a painter's canvass, he had no need to fear a comparison with that great master of the picturesque. From his early youth he had venerated the name of Humboldt, and being in Germany, he made a pilgrimage to Berlin to see him. The homage that he brought to the great traveller was alike honourable to both. It becomes youth to reverence age, and it becomes age to accept the reverence of youth.

"I came to Berlin," says Bayard Taylor, writing

from that city, under the date of November the 25th, 1856: "I came to Berlin, not to visit its museums and galleries, its magnificent street of lindens, its operas and theatres, nor to mingle in the gay life of its streets and saloons, but for the sake of seeing and speaking with the world's greatest living man, Alexander Von Humboldt.

"At present, with his great age and his universal renown, regarded as a throned monarch in the world of science, his friends have been obliged, perforce, to protect him from the exhaustive language of his thousands of subjects, and, for his own sake, to make difficult the ways of access to him. The friend and familiar companion of the King, he may be said, equally, to hold his Court, with the privilege, however, of at any time breaking through the formalities, which only self-defence has rendered necessary. Some of my works, I knew, had found their way into his hands; I was at the beginning of a journey which would probably lead me through regions which his feet had traversed, and his genius illustrated, and it was not merely a natural curiosity which attracted me towards him. I followed the advice of some German friends, and made use of no mediatory influence, but simply dispatched a note to him, stating my name and object, and asking for an interview.

"Three days afterwards I received, through the city post, a reply in his own hand, stating, that although he was suffering from a cold which had followed his removal from Potsdam to the capital, he would willingly receive me, and appointed one o'clock to-day for the visit. I was punctual to the minute, and reached his residence in the Oranienburger-strasse as the clock struck. While in

Berlin he lives with his servant, Seifert, whose name only I found on the door. It was a plain two-story house, with a dull pink front, and inhabited, like most of the houses in German cities, by two or three families. The bell-wire over Seifert's name came from the second story. I pulled: the heavy *porte-cochère* opened of itself, and I mounted the steps until I reached a second bell-pull, over a plate inscribed 'Alexander Von Humboldt.'

"A stout, square-faced man of about fifty, whom I at once recognised as Seifert, opened the door for me. 'Are you Herr Taylor?' he asked: and added, on receiving my reply: 'His Excellency is ready to receive you.' He ushered me into a room, filled with stuffed birds and other objects of natural history; then into a large library which apparently contained the gifts of authors, artists, and men of science. I walked between two large tables heaped with sumptuous folios, to the further door, which opened into the study. Those who have seen the admirable coloured lithograph of Hildebrand's picture, know precisely how the room looks. There was the plain table, the writing-desk covered with letters and manuscripts, the little green sofa, and the same maps and pictures on the drab-covered walls. The picture had been so long hanging in my own room at home, that I at once recognised each particular object.

"Seifert went to an inner door, announced my name, and Humboldt immediately appeared. He came up to me with a heartiness and cordiality which made me feel that I was in the presence of a friend, gave me his hand, and inquired whether we should converse in English or German. 'Your letter,' said he, 'was that of a German, and you must speak the language familiarly; but I am

also in the constant habit of using English.' He insisted on my taking one end of the green sofa, observing that he rarely sat upon it himself, then drew up a plain cane-bottomed chair and seated himself beside it, asking me to speak a little louder than usual, as his hearing was not so acute as formerly.

"As I looked at the majestic old man, the line of Tennyson describing Wellington came into my mind:

'O good gray head, which all men knew.'

The first impression made by Humboldt's face is that of a broad and genial humanity. His massive brow, heavy with the gathered wisdom of nearly a century, bends forward, and overhangs his breast, like a ripe ear of corn, but as you look below it, a pair of clear blue eyes, almost as bright and steady as a child's, meet your own. In those eyes you read that trust in man, that immortal youth of the heart, which make the snows of eighty seven Winters lie so lightly upon his head. You trust him utterly at the first glance, and you feel that he will trust you, if you are worthy of it. I had approached him with a natural feeling of reverence, but in five minutes I found that I loved him, and could talk with him as freely as with a friend of my own age. His nose, mouth, and chin, have the heavy Teutonic character, whose genuine type always expresses an honest simplicity and directness.

"I was almost surprised by the youthful character of his face. I knew that he had been frequently indisposed during the present year, and had been told that he was beginning to show the marks of his extreme age; but I

should not have suspected him of being over seventy-five. His wrinkles are few and small, and his skin has a smoothness and delicacy rarely seen in old men. His hair, although snow-white, is still abundant; his step slow but firm, and his manner active almost to restlessness. He sleeps but four hours out of the twenty-four, reads and replies to his daily rain of letters, and suffers no single occurrence of the least interest in any part of the world to escape his attention. I could not perceive that his memory, the first mental faculty to show decay, is at all impaired. He talks rapidly, with the greatest apparent ease, never hesitating for a word, whether in English or German, and, in fact, seemed to be unconscious which language he was using, as he changed five or six times in the course of the conversation. He did not remain in his chair more than ten minutes at a time, frequently getting up and walking about the room, now and then pointing to a picture, or opening a book to illustrate some remark.

"He began by referring to my Winter Journey into Lapland. 'Why do you choose the Winter?' he asked: 'Your experiences will be very interesting, it is true, but will you not suffer from the severe cold?' 'That remains to be seen,' I answered, 'I have tried all climates except the Arctic, without the least injury. The last two years of my travels were spent in tropical countries, and now I wish to have the strongest possible contrast.' 'That is quite natural,' he remarked, 'and I can understand how your object in travel must lead you to seek such contrasts; but you must possess a remarkably healthy organization.' 'You doubtless know from your own experience,' I said, 'that nothing preserves a man's

vitality like travel.' 'Very true,' he answered, 'if it does not kill at the outset. For my part, I keep my health everywhere, like yourself. During five years in South America and the West Indies, I passed through the midst of black vomit and yellow fever untouched.'

"I spoke of my projected visit to Russia, and my desire to traverse the Russian Tartar provinces of Central Asia. The Kirghiz steppes, he said, were very monotonous: fifty miles gave you the picture of a thousand; but the people were exceedingly interesting. If I desired to go there, I would have no difficulty in passing through them to the Chinese frontier; but the southern provinces of Siberia, he thought, would best repay me. The scenery among the Altai mountains was very grand. From his window in one of the Siberian towns, he had counted eleven peaks covered with eternal snow. The Kirghizes, he added, were among the few races whose habits had remained unchanged for thousands of years, and they had the remarkable peculiarity of combining a monastic with a nomadic life. They were partly Buddist and partly Musselman, and their monkish sects followed the different clans in their wanderings, carrying on their devotions in the encampments, inside of a sacred circle marked out by spears. He had seen their ceremonies, and was struck with their resemblance to those of the Catholic church.

"Humboldt's recollections of the Altai Mountains naturally led him to speak of the Andes. 'You have travelled in Mexico,' said he: 'do you not agree with me in the opinion that the finest mountains in the world are those single cones of perpetual snow rising out of the splendid vegetation of the tropics? The Himalayas,

although loftier, can scarcely make an equal impression; they lie further to the north, without the belt of tropical growths, and their sides are dreary and sterile in comparison. You remember Orizaba,' continued he: 'here is an engraving from a rude sketch of mine. I hope you will find it correct.' He rose and took down the illustrated folio which accompanied the last edition of his 'Minor Writings,' turned over the leaves, and recalled at each plate, some reminiscence of his American travel. 'I still think,' he remarked, as he closed the book, 'that Chimborazo is the grandest mountain in the world.'

"Among the objects in his study was a living chamelion, in a box with a glass lid. The animal, which was about six inches long, was lazily dozing on a bed of sand, with a big blue fly (the unconscious provision for his dinner) perched upon his back. 'He has just been sent me from Smyrna,' said Humboldt; 'he is very listless and unconcerned in his manner.' Just then the chamelion opened one of his long, tubular eyes, and looked up at us. 'A peculiarity of this animal,' he continued, 'is its power of looking in different directions at the same time. He can turn one eye towards heaven, while his other inspects the earth. There are many clergymen who have the same power.'

"After showing me some of Hildebrand's water-colour drawings, he returned to his seat and began to converse about American affairs, with which he seemed to be entirely familiar. He spoke with great admiration of Col. Fremont, whose defeat he profoundly regretted. 'But it is at least a most cheering sign,' he said, 'and an omen of good for your country, that more than a half

million of men supported by their votes a man of Fremont's character and achievements.' With regard to Buchanan, he said: 'I had occasion to speak of his Ostend Manifesto not long since, in a letter which has been published, and I could not characterize its spirit by any milder term than *savage*.' He also spoke of our authors, and inquired particularly after Washington Irving, whom he had once seen. I told him I had the fortune to know Mr. Irving, and had seen him not long before leaving New York. 'He must be at least fifty years old,' said Humboldt. 'He is seventy,' I answered, 'but as young as ever.' 'Ah,' said he, 'I have lived so long that I have almost lost the consciousness of time. I belong to the age of Jefferson and Gallatin, and I heard of Washington's death while travelling in South America.'

"I have repeated but the smallest portion of his conversation, which flowed on in an uninterrupted stream of the richest knowledge. On recalling it to my mind, after leaving, I was surprised to find how great a number of subjects he had touched upon, and how much he had said, or seemed to have said—for he has the rare faculty of placing a subject in the clearest and most vivid light by a few luminous words—concerning each. He thought, as he talked, without effort. I should compare his brain to the Fountain of Vaucluse—a still, deep, and tranquil pool, without a ripple on its surface, but creating a river by its overflow. He asked me many questions, but did not always wait for an answer, the question itself suggesting some reminiscence, or some thought which he had evident pleasure in expressing. I sat or walked, following his movements, an eager listener, and speaking in alternate English or German, until the time

which he had granted me had expired. Seifert at length reappeared, and said to him, in a manner at once respectful and familiar, 'It is time,' and I took my leave.

"'You have travelled much, and seen many ruins, said Humboldt, as he gave me his hand again; 'now you have seen one more!' 'Not a ruin,' I could not help replying, 'but a pyramid.' For I pressed the hand which had touched those of Frederick the Great, of Forster, the companion of Captain Cook, of Klopstock and Schiller, of Pitt, Napoleon, Josephine, the Marshals of the empire, Jefferson, Hamilton, Wieland, Herder, Goethe, Cuvier, Laplace, Gay Lussac, Beethoven, Walter Scott, in short of every great man whom Europe has produced for three-quarters of a century. I looked into the eyes which had not only seen this living history of the world pass by, scene after scene, till the actors retired one by one, to return no more, but had beheld the cataract of Atures and the forests of the Cassiquiare, Chimborazo, the Amazon, and Popocatepetl, the Altaian Alps of Siberia, the Tartar steppes, and the Caspian sea. Such a splendid circle of experience well befits a life of such generous devotion to science; I have never seen so sublime an example of old age, crowned with imperishable success, full of the ripest wisdom, cheered and sweetened by the noblest attributes of the heart. A ruin, indeed! A human temple, perfect as the Parthenon.

"As I was passing out through the cabinet of Natural History, Seifert's voice arrested me; 'I beg your pardon, Sir,' said he; 'but do you know what this is?' pointing to the antlers of a Rocky Mountain elk. 'Of course I do,' said I; 'I have helped to eat many of

them.' He then pointed out the other specimens, and took me into the library, to show me some drawings by his son-in-law, Mühlhausen, who had accompanied Lieut. Whipple, in his expedition to the Rocky Mountains. He also showed me a very elaborate specimen of bead-work, in a gilt frame. 'This,' he said, 'is the work of a Kirghiz princess, who presented it to His Excellency when we were on our journey to Siberia.' 'You accompanied His Excellency, then?' I asked. 'Yes,' said he; '*we* were there in '29.' Seifert is justly proud of having shared for thirty or forty years the fortunes of his master. There was a ring, and a servant came in to announce a visiter. 'Ah, the Prince Ypsilanti,' said he; 'don't let him in; don't let him in; don't let a single soul in; I must go and dress His Excellency. Sir, excuse me—yours, most respectfully,' and therewith he bowed himself out. As I descended to the street, I passed Prince Ypsilanti on the stairs."

In October, of the following year, Mr. Taylor had a second interview with Humboldt, this time at Potsdam.

"As I had business," he writes, "which detained me four days in Berlin, I sent a note to Humboldt, asking permission to call upon him again, in case his time permitted the visit. The next day's express from Potsdam brought me a most kind and friendly reply, welcoming me back to the 'Baltic sand-sea,' as he calls the Brandenburg plain, and stating that, although the Emperor Alexander and his suite were to arrive that evening, he would nevertheless take an hour or two from the excitement of the Court to talk to me about the North. He was residing in the Palace at Potsdam, where he directed me to call at noon on Monday.

"The train by which I left Berlin was filled with officers and diplomatic officials in full uniform, going down to do homage to the Czar. In the carriage in which I sat, were two old gentlemen who presently commenced conversing in French. After a time, their talk wandered to the Orient, and they spoke of Diebitsch and his campaigns, and the treaty of Unkiar-Iskelessi. Suddenly, one of them asked in Arabic, 'Do you speak Arabic?' The other answered in Turkish, 'No, but I speak Turkish.' The first replied in the same language, which, after a time, the two exchanged for Modern Greek, and finally subsided into Russian. I made out that one was a Wallachian, but could discover nothing more, notwithstanding there was an air of a secret mission about them, which greatly piqued my curiosity. With us was also a Prussian regimental surgeon, decorated with the Order of St. Stanislaus for his service in the Crimea.

"Potsdam was all alive with the Imperial arrival. The King of Saxony was also coming to dinner; and, that the three monarchs might be pleasantly diverted in the evening, the sparkling Marie Taglioni, who had arrived with us, tripped out of the cars and off to the Royal Theatre. The park at Sans Souci was in brilliant holiday trim, the walks newly swept, and the fountains jetting their tallest and brightest streams. The streets of the dull little court-town glittered with resplendent uniforms, among which the driver of my carriage pointed out Carl, Albert, and various other princes of the House of Prussia. As we were crossing an open space near the palace, a mounted guard, followed by an open carriage, drawn by a span of superb black horses, suddenly appeared. I at once recognised the punchy figure in a

green military coat, buttoned up to the chin, who sat on the right hand, although I had never before seen his Majesty. My driver reined up on one side and took off his hat. I lifted mine as the King passed, looked at him, and he replied with a military salute. His face was slightly flushed and his eyes bright, and I remember thinking that the heavy and rather stupid air which he wears in his portraits did him injustice. But he was even then, perhaps, laboring under that congestion which struck him down the same night, and from the effects of which he will never recover.

"I was glad when the clock struck twelve at last, and I could leave the rattling streets for that quiet corner of the palace in which Humboldt lives. The door was opened, as before, by Seifert, who recognised me at once. 'Welcome back!' he cried; 'we know where you have been—we have read all your letters! His Excellency has been quite sick, and you will not find him so strong as he was last year, but he is in tolerable health again, thank God! Come in, come in; he is waiting.' Opening the doors as he spoke, he ushered me into a little library, on the threshold of which Humboldt, who had risen, received me. He was slightly paler than before, a little thinner, perhaps, and I could see that his step was not so firm; but the pale blue eye beamed as clear an intelligence as ever, and the voice had as steady and cheery a tone. He shook hands with the cordiality of a friend, and after the first greetings were over, questioned me minutely concerning my travels in the North.

"But one topic soon suggests a hundred others, and he was ere long roaming at large over the whole field of

geography and climatology, touching the farthest and darkest regions of the earth with the light of his stupendous knowledge. The sheets of the new volume of 'Kosmos' lay upon the table. 'Here is what I have been doing, since you were here before,' said he, taking it up: 'the work will be published in two or three weeks.' 'You find yourself, then, still capable of such labour?' I ventured to ask. 'Work is now a part of my life,' said he; 'I sleep so little, and much rest would be irksome. Day before yesterday, I worked for sixteen hours, reviewing these sheets.' 'Are you not greatly fatigued,' I asked, 'after such an exertion?' 'On the contrary,' he replied, 'I feel refreshed, but the performance of it depends greatly on my state of bodily health. I am unconscious of any mental fatigue.' As I saw in the face, and heard in the voice, of the splendid old man, all the signs of a sound, unfailing intellect, I could well believe it. I had prided myself a little on having worked with the brain fifteen hours a day for six months, yet here was Humboldt, in his eighty-ninth year, capable of an equal exertion.

The manner in which he spoke of his bodily health was exceedingly interesting to me. His mind, full of vigour and overflowing with active life, seemed to consider the body as something independent of itself, and to watch, with a curious eye, its gradual decay, as he might have watched that of a tree in his younger days. 'I have been unwell through the Summer,' said he, 'but you must not believe all you may have seen in the newspapers concerning my illness. They stated that I was attacked with apoplexy, but it was only a vertigo, which soon left me, and has not been followed by any of the

usual effects of apoplexy. One result, however, shows that my body is beginning to give way. I have not the same power of controlling my limbs as formerly; the will does not seem to act upon the muscles; there is a link broken somewhere, which it is probably too late to restore. For instance, very often, when I attempt to walk straight forward, I do not feel certain that my legs will carry me in a straight line; they may go either to one side or the other, and, though I cannot notice any real want of strength, I feel uncertain and mistrustful. For this reason, I must have assistance when I go up or down stairs. After all, it is not singular that some parts of the machinery should get rusty, at my age.' Soon afterward, while speaking of Thibet, he referred to a very fine copperplate map, and I noticed that he saw the most minute names distinctly, without the aid of spectacles. But then he has the eyes of a youth of twenty years. Age may palsy his limbs, but it has never looked out of those windows.

"After I had been sitting an hour, Seifert came to the door and said: 'The two gentlemen have come—shall I admit them?' I rose to leave, but Humboldt said: 'No, no—remain. They are from Hong-Kong; perhaps you know them.' I looked at the cards, and recognised an acquaintance in the name of an editor of a Hong-Kong paper. The other was a Government official. After they entered, the conversation took a more general tone, but I was not sorry for this afterwards, as it gave Humboldt occasion to recall some scenes of his early life. One of the visitors spoke of Frederic the Great. 'I remember him well,' said Humboldt: 'I was sixteen years old when he died, and I can see his

face still as plainly as I can see yours. I was but eighteen when I visited England for the first time. It was during the trial of Warren Hastings, which I frequently attended. I remember that I heard Edmund Burke, Pitt, and Sheridan, all speak on the same night.'

"I shall not repeat his account of the Congress of Verona, or his anecdotes of Alexander I. of Russia, whom he knew intimately, as I am not certain whether I have a right to do so at present. After the visitors left, I remained with him until it was time for him to prepare for the dinner given to Alexander II., to which he was bidden. 'You will pass through Berlin on your way to Moscow?' said he. 'Yes.' 'Well—I must be polite enough to live until then. You must bring your wife with you. Oh, I know all about it, and you must not think, because I have never been married myself, that I do not congratulate you.' After these cordial words, and a clasp of the hand, in which there was nothing weak or tremulous, I parted from the immortal old man.

"I was glad to learn from Seifert, that Hildebrand's admirable water-colour drawing of Humboldt in his library is soon to be printed in chromotint, so that very accurate copies of it can be obtained at a moderate price. As I have not only seen the original but the room and man that it represents, I can testify to its entire fidelity, and would suggest to Humboldt's admirers in America that they cannot procure a better illustration of him. I suppose copies of it will be sent to America for sale. Herr Möllhausen, Seifert's son-in-law, who is now attached, as artist, to the expedition for the survey of a wagon-road to the Pacific, prepared for the press, before

leaving Berlin, a splendidly illustrated work on the Gila Country, which is now being published under the patronage of the King. It will cost about twenty-eight dollars a copy. Humboldt himself wrote the preface, a copy of which he gave me. He was greatly gratified at the readiness with which our present Secretary of War gave Mr. Möllhausen a second appointment."

Such was Alexander Von Humboldt, author and traveller, as he appeared to authors and travellers in the palace of his King, and in his own quiet home. To the citizens of Potsdam and Berlin, all of whom knew him by sight, he appeared in a somewhat different light; for while many of them were ignorant of him as an author and traveller, or had at best but a vague idea of his world-wide renown in this respect, none were ignorant of his rank as one of the King's privy councillors. Everybody knew His Excellency, the Baron Von Humboldt, and honoured him like the King himself. He was often seen at Potsdam, walking on the terrace of Sans Souci with his Majesty, Frederic William IV., or sauntering by himself in the avenues of the park. One of his favourite haunts at Sans Souci was a shady walk, in a retired part of the garden. He loved this spot because it reminded him of his friend, the former King, who was buried there. Frederic William III. slept by the side of his queenly wife in a stately marble monument, the work of the sculptor, Rauch. Upon this monument was a recumbent statue of his Majesty,

"With his martial cloak around him."

But it was in Berlin after all that Humboldt was best

known. His house in the Oranienburger-strasse was, as we have said, in the neighbourhood of the palace, to which he went daily when the King was in Berlin. All the inhabitants of the city, men, women, and children, knew his slender figure and white hair. He walked with a firm but slow step, with his head bent on his breast. His dress was simple, a plain black suit, without ribands or orders, and he had the Napoleonic habit of carrying his hands behind him. His eye was generally fixed on the ground, but he always noticed and returned the greetings of the citizens. He was as much at home in the street, as in his own private study, for the passers-by stepped softly aside for fear of disturbing his thoughts; the poorest working-man gazed after him as he passed, and whispered to his comrade or neighbour: "There goes Humboldt."

Often in the summer twilight the old man was seen wending his way to the beautiful avenue—Unter den Linden. A few minutes' walk from his house brought him to Frederic's-strasse, and the bridge that crossed the Spree, and a few minutes more to Unter den Linden, which was crowded with promenaders. Up and down the avenue of lime trees, now in shadow and now in sunshine, the figure of the old man moved, his hands behind him, and his head drooping on his breast. Of what is he thinking as he walks there in the mellow twilight? Of Chimborazo and Cotopaxi, or the dreary wastes of Central Asia? Or of the yet unwritten volume of "Kosmos?" Perhaps he dreams of his early days, the far off golden time when he was a boy at Tegel. Let the old man dream, ye gay promenaders! Disturb him not with your laughter; let him not hear your foot-

steps as you pass him. He has earned the right to dream, for his dreams are worlds!

The only drawback to Humboldt's happiness in his last years, was the flood of letters which poured in upon him. He had always corresponded largely with scientific men in all parts of the world. He was glad to learn of their experiments and discoveries, and to communicate his own in return. But to be deluged as he was with letters in his latter days was intolerable.

"I work," Humboldt wrote to his friend, Julius Froebel, in January, 1858, "I work mostly in the night, because I am unmercifully tormented with a constantly increasing correspondence, for the most part of not the slightest interest. I live joyless in my eighty-ninth year, because of the much for which I have striven from my early youth, so little has been accomplished.

"Your illegible,
"AL. HUMBOLDT."

It was only of those who pestered him, however, autograph hunters, and the like, that Humboldt complained, not of scholars and *savans*, and least of all of his friends. His pen was as ready in their service as his purse had been in former years, and would have been still, had there been anything in it. Witness this letter to George Ticknor, the historian of Spanish Literature.

"MY DEAR AND EXCELLENT FRIEND:—Bonds of friendship, which have their origin so far back as my family, and the affection felt for you by my brother, William Von Humboldt, when you lived in Germany, as a young man, seem to impose on me the very plea-

sant duty of giving you some sign of life—that is to say a renewed proof of my attachment to you and my interest in your country, and a brief account of my labours.

"My physical strength declines, but it declines slowly. My steps are more uncertain in their direction, owing to a feebleness of the ligaments of the knees; but I can remain standing for an hour without being fatigued. I continue work chiefly at night, being unrelentingly persecuted by my correspondence, which increases the more as one becomes an object of public curiosity. What is called literary celebrity is especially the result of long endurance of life. This kind of eminence increases, therefore, in proportion as imbecility becomes more manifest. I am never really ill, but often incommoded, as is to be expected at the age of eighty-nine.

"Since we were only two persons in the American expedition (the unfortunate Carlos de Montufar, son of the Marquis de Selvalegra of Quito, fell a victim to his love for the liberty of his country), it is somewhat remarkable that we should both have reached so advanced an age. Bonpland, still much occupied with scientific labours, even cherishing the hope of visiting Europe again, and of bringing in person back to Paris his rich and beautiful collections in botany and geology, is eighty-five years old, and enjoys greater strength than I do.

"I have just published in Germany the fourth volume of Kosmos, and they are now printing the fifth volume, which completes that work so imprudently begun and so favourably received by the public. Gen. Sabine writes me that the English translation is finished and will appear immediately. The same news comes to me

from France, from M. Galuzzi, who has been passing the winter in the South, at Cannes.

"The great and beautiful work of Agassiz (the first two volumes) reached me only a few days since. It will produce a great effect by the breadth of its general views and by the extreme sagacity of its special embryological observations. I never believed that this illustrious man, who is no less a man of a constant and beautiful nature, would accept the offers nobly made him in Paris. I was sure that gratitude would bind him to a new country where he finds a field so immense for his researches and great means of assistance. I hope he may be inclined, together with his great anatomical and physiological labours among the inferior organisms, to give us also the specific ichthyology of the numerous basins of the 'Far West,' beginning with the *Holy* Empire of the Mormons.

"Science has lately met with an immense loss here by the unexpected death of the greatest anatomist of our country, Prof. Johann Müller. This loss is as great for science, as was for art the death of the immortal sculptor Rauch. The universality of his zoological knowledge in the inferior organizations placed Johann Müller near Cuvier, having a great pre-eminence in the delicacy of his anatomical and physiological work. He made long and painful voyages, at his own expense, on the shores of the Mediterranean and in the Northern Seas. It is scarcely two years since he came near perishing by shipwreck on the coast of Norway. He sustained himself by swimming for more than half an hour, and considered himself quite lost when he was wonderfully rescued. I lose in him a friend who was very dear to me. He was a man of great talent, and at the same time of a noble

character. He was admirable for the elevation and independence of his opinions. By making enormous sacrifices he was able to form a choice library, not only of anatomy, physiology, and zoology, but one that extended over all the physical sciences. It consists of more than three thousand volumes, well bound, and of as many more volumes containing dissertations, so difficult to collect. Mr. Müller spent nearly eight hundred thalers a year for binding alone. It would be sad to see a collection dispersed and broken up, which was made with so much care. Since duplicates are dreaded in Europe, I cannot help fearing lest this fine collection should cross the great Atlantic *river*. I have almost the air of exciting your appetite when I thus present myself before you as a citizen of the world, while the *Church* journal of Vienna calls me, in capital letters, a naturalist assassin of souls, 'Selen-mörder.'

"Accept, I beg you, my dear and respected friend, the renewal of the high and affectionate consideration which, for so many years, I have given to your talents and to your character.

"A. V. HUMBOLDT.

"BERLIN, 9th May, 1858.

"Since so many benevolent persons, colored as well as white, in the United States, take an interest in me, it would be agreeable to me, my dear friend, if this letter, translated into English by you, could be *printed*, without omitting what relates to our mutual friendship. If you think it necessary you can add that I have myself begged of you this publication, because I leave unanswered so many letters that are addressed to me."

The last page of the fifth and last volume of "Kosmos" was finished on the 14th of September, 1858. It was a happy day with Humboldt, for he had lived to finish his life-long task; besides, it was his birth-day, his eighty-ninth birth-day. His friends assembled at his house and congratulated him. "Never," says an English correspondent, "did conqueror receive greater congratulations from so many persons, and from such great distances, as the postboy had to carry on Tuesday morning to the well-known house in the Oranienburger-strasse.

"Humboldt is said to be of the opinion that he will die next spring; but his friends who observe him speak differently, and are bold enough to predict that this time he is in error, and that a very different celebration than the one he anticipates will next year take place in his house."

Autumn passed, and winter came, and still the old man lived; so far as his friends could see there was no danger of his prediction being fulfilled. They would meet him on his ninetieth birthday, and banter him on his mistake.

"Yesterday," a young American wrote from Berlin on the 23d of February, 1858; "yesterday was Washington's birth-day, and we celebrated it by a grand dinner at the American Minister's, Gov. Wright. Some eighty or ninety persons were present, among them the Baron Von Humboldt, whom we all reverence above any man living. I shall remember it until the last moment of my life, and it will be with pride that I can say that I was present upon that occasion in which he honoured the American nation, in his old age, with his presence at a dinner given in remembrance of 'The Father of our Country.'

"The dinner was set at three o'clock, and every one was already there a little before the hour, in order to be present when Humboldt came. He entered the room precisely upon time. He is a very short man, and quite infirm, and it is with difficulty that he is able to walk. Of course as soon as he was placed in his chair, the Minister introduced the ladies and many of the gentlemen present. After a few minutes' conversation the party adjourned to the dinner, and the 'devouring of eatables' took place after a short blessing from a clergyman.

"Gov. Wright made the first speech, and spoke of the occasion which had brought them together in a very eloquent manner, and gave as the first toast, 'The Prince and Princess of Prussia,' and for the second, 'Washington's birthday.' Next the Secretary of Legation made a few remarks, and gave a toast in which he coupled the names of 'Washington and Humboldt,' which was drunk standing, and three rousing cheers given. After some other speeches and toasts were given, Mr. Thayer (correspondent of *Dwight's Journal of Music*) gave the following, which I consider the best toast of the occasion: 'The Baron Von Humboldt—the King of Science, the latchet of whose shoes no common Kings are worthy of unloosing.' It made a tremendous noise, and Humboldt spoke in answer; but his voice was so feeble, and his language so indistinct, that I believe no one understood what he said. He remained two hours and then left, as he can bear but little excitement. As his greatcoat was being put on I was standing quite close to him, and seized the opportunity of touching his cape, which is honour enough for me."

CHAPTER II.

BACK TO TEGEL.

TOWARDS the end of April, 1859, the citizens of Berlin began to miss His Excellency, the Baron Von Humboldt. They met him no longer in the street in the afternoon walking towards the palace; neither did they see him at twilight in his favourite haunt, Unter den Linden. "Where is His Excellency?" they asked, but none could answer. In a few days the question was changed to "How is His Excellency?" for they had learned in the meantime that he was ill. The postboy still made his morning calls at the famous little house in the Oranienburger-strasse, and from time to time through the day carriages stopped near by, and stately gentlemen, decorated with orders, alighted and rang the bell softly.

On the morning of the 3rd of May, the journals of Berlin announced his illness.

"Alexander Von Humboldt has been confined to his bed for the last twelve days; his strength has been gradually failing; his mind retains all its clearness, though his power of expression has decreased. In the dangerous condition of the revered patient, the greatest care and precaution against all excitement is necessary."

Then followed the bulletin of his health.

"*May* 2.—The fever has somewhat abated since last evening. The catarrh is also less violent. The condition of the patient in his very weak state is still very doubtful."

The bulletins were continued from day to day.

"*May*. 3.—Very great loss of strength; his condition in a high degree doubtful.

"*May* 4.—The condition of Humboldt during the night of Monday–Tuesday, was exceedingly critical, through the violent fits of coughing and difficulty of breathing. Towards noon of Tuesday the patient was much improved in various respects, but the continued loss of strength renders his position to a high degree critical.

"*May* 5.—Humboldt's condition since yesterday almost unchanged. Weakness increasing.

"*May* 6.—(Friday morning)—The strength of the patient is decreasing from hour to hour."

The last hours of the dying man were soothed by the presence of his relatives, who flocked to his residence as soon as they heard of his illness. First came from Tegel the Baroness Von Bülow,—once his merry little niece Gabriele, but now a placid widow of fifty-seven; then the husband of his niece Adelheid, General Von Hedemann; and then, from Ottmachan, his nephew Hermann, and his grandnephew William, the son of "the amiable Theodore," of whom Frau Caroline wrote more than sixty years before.

Shall we describe the chamber of the dying man—the darkened walls touched with the sunlight that creeps through the half-closed blinds—the group of sorrowing friends around his bed—his reverend white hair, his

divine blue eyes, the smile on his kind old face? No. The death of the humblest man is too sacred a thing to make a picture of; how much more sacred then the death of Humboldt—the greatest and best of men!

He died on the 6th of May at half-past two o'clock in the afternoon. A few moments before his death the blinds were opened, and the full blaze of the sun poured into the chamber. "How grand those rays," he murmured: "they seem to beckon Earth to Heaven." He closed his eyes like a wearied child, and slept the long long sleep.

The tenth of May was set apart for the funeral. Early in the morning the citizens of Berlin were seen hurrying in the direction of Frederic-strasse and Unter den Linden, through which the procession was to pass. The houses in the Oranienburger-strasse were hung with crape, and decorated with black flags: Humboldt's house was closed. The police kept the street clear, admitting into it only those who were to take part in the ceremonies. They soon made their appearance—Ministers of State, Generals of the army, and grave and learned professors. There was Dove, Rector Magnificus of the University, Encke, the celebrated astronomer, Professor Mitscherlich, Carl Ritter the great geographer, and a host of authors and artists. Before starting they entered the house to take a last look at the illustrious dead. He lay in a large oaken coffin in his study, surrounded by his books. Over him hung his portrait, wreathed with palm-leaves and exotic flowers. At eight o'clock the coffin was borne down the stairs, and placed in the funeral-car. The crowd uncovered their heads as the coffin appeared.

Presently the procession started. It was headed by Seifert and the servants of the family. Then came the students of the Frederic William University, six hundred in all, led by marshals bearing black rods; then a band of musicians playing solemn music, and followed by eight clergymen in official robes. Next came the three court chamberlains, the Count of Furstenberg Stammhein, Count Von Donhoff, and Baron Von Zecklitz, and a fourth appointed for the occasion. They bore on red velvet cushions the insignia of the Order of the Black Eagle, the medal of the Grand Chancellor of the peace class of the Order of Merit, and the countless medals and orders which the sovereigns of Europe had showered upon Humboldt. Then came the hearse covered with black, and drawn by six black horses from the royal stables. The horses were led by royal grooms, who were attended by five court footmen, and a yager. Behind the hearse were twenty deputies of the Students' Society, each with a palm branch in his hand. Upon the coffin, which was also decorated with palm-leaves, were two crowns, one of laurel, the other of white azalea branches. The male relatives of the dead followed—General Von Hedemann, Hermann Von Humboldt, and William Humboldt-Dacheröden; together with a number of Knights of the order of the Black Eagle, headed by the chief of the order, General Von Wrangel, and the Generals of the infantry and cavalry, Prince Wradzivill, and Count Von der Groeben. Then came the Ministers of State in their brilliant uniforms, officers of the Court, Privy Councillors, and the members of the diplomatic corps. Among the latter was the American Minister, Governor Wright, and all the Americans in Berlin. Then a deputation from

both Houses of the Legislature; the members of the Academy of Sciences; the Professors of the University, headed by the Rector Magnificus; the members of the Academy of Arts, and some of the most distinguished actors of the Royal Theatre. Then the magistrates and officials of the city, each wearing a gold chain and a medal over his coat. Then the citizens of Berlin, old and young, rich and poor, with a great number of strangers, many of whom had come from a long distance to show their respect to the dead. The rear was formed by a line of empty carriages, half a mile in length, headed by the State carriage of the King and Queen, drawn by eight horses, the carriage of the Prince Regent, and those of the Princes and diplomatic corps.

Solemn and slow to the sound of mournful music the procession wended its way to the Dom Church. As it passed through Frederic-strasse the pupils of the Frederic Gymnasium sang a hymn. The windows were draped with black and thronged with respectful faces: the crowds in the street stood uncovered and silent. Not a sound was heard save the rain-like patter of feet, and the yearning soul of the music. As soon as Unter den Linden was passed the church bells began to toll, and the Choral Society of Berlin broke into a hymn.

The Prince Regent, and the Princes of Prussia, standing with their heads bared like the meanest of their subjects, received the coffin at the portico of the Dom Church. It was borne into the church, followed by the court preacher and several ministers, and placed on a bier before the altar, which was decorated with palms and flowers. The chamberlains deposited their cushions laden with orders on either side, and stood at the head of the

coffin; the royal personages and the relatives of Humboldt stepped within the altar-railing, and the organ began to peal. The congregation sang "Jesus my trust." "Blessed are the dead," said the Priest, "who die in the Lord." "Yea, saith the Spirit," the choir answered, "for they rest from their labours. Hallelujah!" A prayer was then made, a funeral sermon was preached, and the Lord's Prayer was said. Then the grand old chorals, "Be comforted and most happy," and "Christ is my Life," were sung, and the ceremony was over. The procession departed as it came, with pattering feet and melancholy music. The church was soon deserted of the living, but the dead remained, in the oaken coffin under the solemn dome, alone with God!

That night the body was removed to Tegel.

R. H. S.

THE END.

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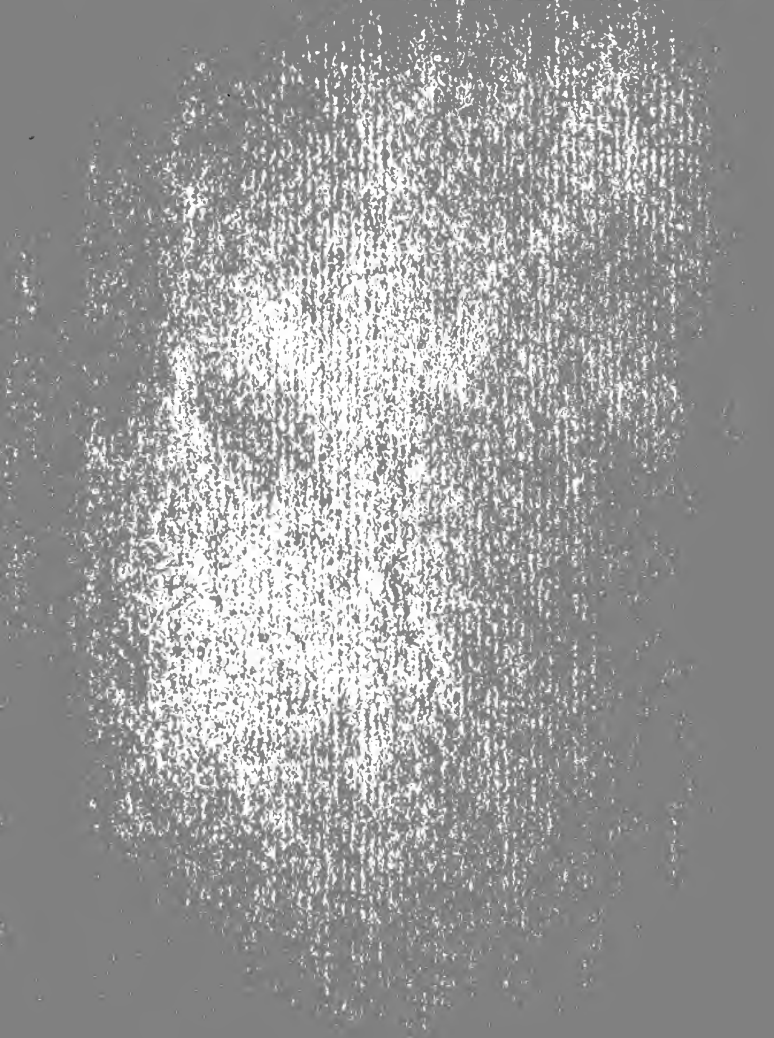

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